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# PROCEEDINGS

OF THE

## SCIENTIFIC MEETINGS

OF THE

### ZOOLOGICAL SOCIETY OF LONDON.

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January 5, 1875.

Dr. E. Hamilton, V.P., in the Chair.

The Secretary read the following report on the additions to the Society's Menagerie during the month of December 1874.

The total number of registered additions to the Society's Menagerie during the month of December was 47, of which 16 were by presentation, 17 by purchase, 4 by exchange, and 10 were received on deposit. The total number of departures during the same period, by death and removals, was 104.

The most noticeable additions during the month of December were as follows:—

1. A Campbell's Monkey (*Cercopithecus campbelli*), purchased 15th December.

This scarce West-African Monkey, which was originally described by Mr. Waterhouse in our 'Proceedings' (1838, p. 6), and subsequently figured in Fraser's 'Zoologia Typica' (pl. iii.), is seldom received alive. The present example is a young female. I have only previously seen one other living example of this species.

2. Two Hardwicke's Mastigures (*Uromastix hardwickii*), presented by Lieut.-Col. C. S. Sturt, C.M.Z.S., 23rd December.

3. A young pair of the Pampas Deer of the interior of Brazil and Buenos Ayres (*Cervus campestris*), purchased December 23rd.

This Deer is seldom met with in living collections. We have had no examples of it in the Society's Gardens since 1860.

The Secretary read the following extract from a letter addressed to him by Dr. George Bennett, F.Z.S., of Sydney.

"Sydney, October 22nd, 1874.

"I have sent you a Beetle (*Chrysocroa ocellata*), enclosed in a small box, by this mail. This insect was presented to me by Capt. Payne, of the barque 'William Manson,' by whom it had been captured at sea at a great distance from land. His account of the capture is as follows:—

"The Beetle was caught by me in the Bay of Bengal in lat. 17° N., and long. 90° E., being at that time the distance of 273 miles from the nearest land, namely the west coast of Pegu. The insect lived for ten days after being enclosed in a small box after its capture."

The Secretary exhibited for Mr. Andrew Anderson, F.Z.S., of Puttneyghur, an egg and young of the Gavial (*Gavialis gangeticus*), and read the following remarks on them by Mr. Anderson:—

"I send for exhibition by the Secretary an egg of *Crocodilus gangeticus* (*Gavialis gangeticus*). I take this opportunity of pointing out that the word 'Gavialis' should properly be spelt with an *r*, and not with a *v*, the vernacular for the Long-nosed Crocodile being 'Gharial.'

"This egg is one of forty which I dug out of the sand; they were laid in two tiers, twenty below, and twenty above, with a stratum of sand about 1 foot deep between the two layers. Apparently the first batch had been laid and covered over with sand a day or two before the second instalment.

"Also a young Gharial about two months old, to which I acted as *accoucheur*. This is one of several which were kept alive in a tub; they ran with amazing rapidity the moment they were hatched. Some of them actually bit my fingers before I had time to remove the shell from their bodies.

"Length (on exclusion from shell) 15·8 inches; snout, from eye, 1·6; between fore and hind leg 2·8; from hind leg to end of tail 9; girth 4. Colour greyish brown, with five irregular transverse bands between fore and hind legs; nine more similar marks across the tail."

A letter was read from the Marquess of Normanby, F.Z.S., dated Government House, Brisbane, Queensland, Oct. 10th, 1874, stating that he had forwarded to the Society in the ship 'Ramsay,' under the care of Capt. Cater, a fine living specimen of the Australian Cassowary (*Casuarus australis*)\*.

A letter was read from Sir Victor Brooke, Bart., F.Z.S., pointing out that in his paper on *Cervulus* (P. Z. S. 1874), at page 41, the ninth line from the bottom, the paragraph "Females hornless" down

\* See below, p. 82.

to "metatarsals absent" should have been transferred to page 38 and inserted after the words "project inwards," which occur immediately before "*Cervulus muntjac*," in the eighteenth line from the bottom.

The following papers were read:—

1. Descriptions of thirty-three new or little-known Species of *Sphingidæ* in the Collection of the British Museum. By ARTHUR GARDINER BUTLER, F.L.S., F.Z.S., Assistant, Zoological Department, British Museum.

[Received November 24, 1874.]

(Plates I. & II.)

I have for some time past been carefully working at a complete revision of the Sphingidæ, the results of which labour I hope shortly to have the pleasure of laying before the Society.

Being naturally anxious to secure as many types as possible to our national collection, and knowing that this section of the Lepidoptera is a favourite one, I have thought it best to publish at once characters of the more striking new forms which we possess. This will still leave to my more important paper all the new genera, several new species in the British Museum, two or three that have been kindly placed in my hands by Mr. Lewis, besides others which I hope to obtain through the kindness of Mr. F. Moore\*. I also hope to figure the early stages of several species already known to science.

#### Subfamily MACROGLOSSINÆ.

##### Genus SATASPES, Moore.

##### 1. SATASPES UNIFORMIS, n. sp.

Closely allied to *S. infernalis*, but differing in the absence of the broad yellow transverse bar at the end of abdomen. Expanse of wings 2 inches 7 lines.

Silhet (*Stainsforth*).

Type, B.M.

We have two examples of this species, and I have seen others.

##### 2. SATASPES VENTRALIS, n. sp.

Allied to the preceding and to *S. infernalis*, but differing from both in the bright bronzy green colour of the basal two thirds of primaries; abdomen black-brown, with a dorsal series of pale yellow squamose spots on the posterior area of each segment excepting the basal one; the four apical segments below bright sulphur-yellow. Expanse of wings 2 inches 7 lines.

Hong-Kong (*Bowering*), Silhet (*Stainsforth*).

Type, B.M.

\* Since the above paper was read, Mr. Moore has most generously placed the whole of his fine collection at my disposal, thus giving me the opportunity of identifying several of his and Mr. Walker's species; he has also lent me several most valuable figures of larvæ, which have been of the greatest use to me.

## Genus MACROGLOSSA, Ochsenheimer.

## 3. MACROGLOSSA FERVENS, n. sp. (Plate I. fig. 3.)

Primaries above red-brown; basal two fifths chocolate-brown; a transverse nebulous wavy discal bar of the same colour; two transverse subapical blackish spots; secondaries bright ferruginous, costa testaceous; outer margin dusky: head, thorax, and three basal segments olivaceous; these segments orange-tawny at the sides, edged with dark brown; terminal segments dark brown; last segment edged behind with an unbroken transverse line of snow-white scales; a lateral ochre-tipped black tuft; anal tuft dark brown: wings below bright ferruginous, bright ochreous at the base, crossed by several indistinct darker lines; outer margin rather broadly olive-brown; palpi, pectus, and basal segments of abdomen cream-coloured; remaining segments red-brown; central segment with a small lateral white tuft; two terminal segments with lateral ochre-tipped blackish tufts; anal tuft red-brown. Expanse of wings 1 inch 7 lines.

Canara (*Ward*).

Type, B.M.

Allied to *M. gyrans* and *M. approximata* of Walker; its position will be between the latter and *M. gilia* of Walker (*walkeri*, Butl.).

## 4. MACROGLOSSA PROXIMA, n. sp. (Plate I. fig. 1.)

Primaries above dark chocolate-brown, crossed by two diffused sericeous bars; a waved dark-brown transverse streak just beyond the cell; secondaries with basal half sordid ochreous, impinged upon at base by two diverging black basal dashes, and diffused externally; costa broadly bright stramineous, outer margin broadly dark brown: head and abdomen smoky brown; thorax red-brown; sides of abdomen rusty brown, three basal segments with lateral quadrate spots, black internally, broadly orange externally; the three penultimate segments with lateral ochre-tipped brown tufts; last segment but one white-edged externally; anal tuft dark brown, with a broad terminal orange bar: wings below red-brown, ochraceous at base; secondaries with an orange abdominal streak; palpi below sordid white; pectus sordid testaceous, brownish at the sides; legs testaceous, irrorated with brown, the tibiae of last pair fringed with ferruginous; two basal segments of abdomen ochreous; remaining segments and anal tuft ferruginous internally, dull ochreous externally. Expanse of wings 2 inches 5 lines.

Canara (*Ward*), Ceylon (*Templeton*).

Type, B.M.

Some varieties of *M. passalus*\* nearly resemble this species on the upper surface, but differ in having four distinct transverse blackish lines across the primaries, a much less prominent orange terminal bar to the anal tuft, and an entirely different coloration on the under surface of the abdomen.

\* It is almost certain that the latter are distinct from *M. passalus*, as the typical Chinese form is altogether redder in hue than its Indian representative; but at present I have not sufficient examples to enable me to separate them with certainty.

5. *MACROGLOSSA OBSCURA* (Horsfield, MS.). (Plate I. fig. 2.)

Allied to *M. passalus*, but duller in colouring, the primaries more acute and longer, the transverse lines less distinct, the secondaries with a broader, more defined, more irregular, and paler central orange band; the three basal segments of abdomen edged laterally with testaceous instead of orange; secondaries below with a sharply defined internal subtriangular patch, pale yellow at base, but becoming gradually orange externally. Expanse of wings 2 inches 7 lines.

Java (*Horsfield*).

Type, B.M.

6. *MACROGLOSSA TROCHILOIDES*, n. sp.

Closely allied to *M. trochilus*, but altogether brighter in colouring, the primaries much darker, the secondaries with well-defined central orange band; outer margin distinct and black. Expanse of wings 1 inch 5 lines.

Sierra Leone (*Foxcroft*).

Type, B.M.

This is the Western-African form of *M. trochilus*.

7. *MACROGLOSSA NOX*, Newman. (Plate I. fig. 6.)

*Male*. Primaries above black-brown, bronzy greenish in some lights, base and three indistinct wavy bars black; secondaries with the base and outer margin broadly black, central area very dark grey, silvery greenish in certain lights: body ashy black, with a lateral bright steel-blue lustre when the tail is turned to the light; basal and three terminal segments with large lateral black spots; all the segments with small lateral white-tipped black tufts, penultimate segment white-edged; anal tuft black, pale brown at the base, and white at the tip: wings below black-brown, with bronzy greenish reflections, whitish at base; secondaries shot with pale steel-blue towards base, abdominal area bluish white: body smoky brown, thorax paler; prothorax and palpi sordid white. Expanse of wings 2 inches 9 lines.

Rockingham Bay (*Macgillivray*).

Type, B.M.

Described by Mr. Walker as the female of *M. micacea*.

Genus *CALLIOMMA*, Walker.8. *CALLIOMMA LUTESCENS*, n. sp. (Plate I. fig. 5.)

Primaries above clay-colour, transversely and irregularly spotted with dark grey in wavy series; an interno-basal dark grey streak: two transverse, angulated, subbasal whitish streaks, beginning on costa and terminating at first median branch, separated by a grey streak, and bounded externally by a zigzag oblique grey bar from costa to inner margin; a subtriangular, whitish, central costal spot, impinged upon by an irregular discocellular silver marking; a whitish costal patch immediately beyond it, interrupted by indistinct grey lituræ; apex somewhat pale; outer margin with a large, subapical, marginal, lunate, chocolate-coloured patch, bordered internally by a pearly greyish nebula; secondaries orange, shining and whitish on costa, but gradually deepening in tint to abdominal margin; outer

margin broadly but diffusely ferruginous, irregularly blotched with black, and bounded internally by an undulated blackish line; an elongate, whitish marginal spot near anal angle: body pale clay-coloured; the pterygodes red-brown, tipped with whitish and dark brown on the shoulders; second, third, and fourth segments of abdomen with more or less defined, inverted, V-shaped markings in the middle: wings below altogether paler; primaries with discoidal area dull tawny, internal margin stramineous, external half crossed by transverse series of brown spots, outer margin rather broadly and irregularly pale brown; secondaries whitish clay-colour, a spot within cell, and five undulated, partly interrupted, transverse lines (the outermost one indistinct and confounded with a sprinkling of scales of the same colour on external area) brown: body clay-coloured, palpi and thorax deeper-coloured; abdomen with two ventral series of central grey spots. Expanse of wings 2 inches 9 lines.

Haiti (*Tweedie*).

Type, B.M.

Allied to *C. parce*.

#### Subfamily CHÆROCAMPINÆ.

#### Genus PANACRA.

##### 9. PANACRA METALLICA, n. sp.

Allied to *P. mydon*. Differs in its greater size, longer and more acute primaries, with the outer margin well excavated below the apex; apical half much yellower; transverse lines more oblique, not undulated, the central ones very distinct, four in number, angulated just before reaching the costa; secondaries longer, more acute at the apex, the ochreous streak less diffused; body longer, thorax more uniform in colouring; abdomen with the lateral golden streak broader, more distinct; primaries below brown, with the costa and outer margin, a discocellular point, several lituræ in a discal series, one or two more subapical, and a squamose, dentated, subanal patch bright ochreous; disk also varied with red, and clouded at apex and centre with brown; a submarginal series of markings, the two nearest apex white and lunate, one at external angle black and white, ovate, the intermediate ones forming a semi-connected irregular grey streak; secondaries brown, with the costa, outer margin, a spot at anal angle, and a submarginal anal streak bright ochreous, irrorated with red; a bright yellow discocellular point; two irregular, ill-defined, central dark brown lines; disk plumbaginous: body below creamy, speckled with ferruginous; abdomen with a lateral series of black points. Expanse of wings 2 inches 9 lines.

North India (*Parry*).

Type, B.M.

This is labelled by Boisduval with his MS. name of *P. mydon*; it is not, however, Walker's type.

#### Genus DAPHNIS, Hübner.

##### 10. DAPHNIS PALLESCENS, n. sp.

Allied to *D. hypothous*, same general pattern; primaries with the



pale rosy whitish bands broader, less distinctly white-edged; the dark markings paler, more olive-tinted; external angle slate-coloured; apical white spot smaller; secondaries whity brown, with a central dark-grey nebula leaving a distinct postmedian in-arched line of the ground-colour; beyond and bounding this is a broad, submarginal, purplish-brown band; outer margin broadly pale brown, darker externally (the submarginal band and the marginal border both narrowest at anal angle): body, with the collar, base, and sides of abdomen whitish; pterygodes olive, head and thorax grey; dorsum of abdomen greyish brown; antennæ pale ochreous: wings below much like *D. hypothous*, but paler. Expanse of wings 3 inches 7 lines.

Queensland (*Janson*).

Type, B.M.

### Genus PERGESA, Walker.

#### 11. PERGESA AURIFERA, n. sp.

Primaries olive-green, base transversely spotted with black; a violet-centred black spot at end of cell, and from it to inner margin a nebulous dusky bar; disk more or less clouded with reddish, crossed obliquely from costa to inner margin by three parallel rows of black spots; three large costal subapical black spots; outer margin pearly, irrorated with black; fringe dull ochraceous; secondaries black-brown, costal area pale brown; an anal, submarginal, curteiform, dull ochreous fasciole: body olive-green, head margined with whitish; pterygodes grey, black-bordered; abdomen with two longitudinal series of black dots, a lateral golden-yellow streak from second segment, and a broad, undulated, golden-yellow lateral border, each undulation with a central black dot: wings below nearly as in *P. castor*, but the black lines and dots heavier. Expanse of wings 3 inches 5 lines.

Sikkim (*Whitely*).

Type, B.M.

Var. Primaries and body clay-colour, with a slight greenish tinge.

North India (*Janson*).

B.M.

Allied to *P. castor*, but differing (besides colour-characters) in the much more acute falcate form and greater width of the primaries.

### Genus CHÆROCAMPA, Duponchel.

#### 12. CHÆROCAMPA MACROMERA, n. sp.

Nearly allied to *C. elpenor*, but much larger, the primaries duller in colour, with the outer margin more broadly rosy lilacine; secondaries with more than half the wing rosy; body with the dorsal rosy line less defined; wings below with the costal ochraceous border duller, much narrower, only clearly represented towards base; transverse band converted into two narrow parallel lines. Expanse of wings 3 inches 4 lines.

Silhet (*Macgillivray*), North India (*Stevens*).

Type, B.M.

Noted by Mr. Walker as a variety of *C. elpenor*; I am satisfied, however (from the fact that the more nearly allied Japanese species is now proved by breeding to be distinct), that it is a different species.

13. *CHÆROCAMPA GRACILIS*, n. sp. (Plate II. fig. 2.)

Nearly allied to *C. eson*, about one third smaller; the wings and abdomen, as compared with the size of the insect, longer; the primaries decidedly less distinctly streaked, the streaks also narrower; secondaries blacker at base, much whiter at anal angle; lateral streaks of thorax much whiter; abdomen very indistinctly streaked, not showing the two broad longitudinal central brown bands; wings below less irrorated with brown, central oblique lines of primaries not extending beyond the middle of the wing from costa; abdomen below not showing the lateral blackish points. Expanse of wings 3 inches to 3 inches 2 lines.

Congo (*Richardson*), Sierra Leone (*Morgan*). Type, B.M.  
We have four examples of this species.

14. *CHÆROCAMPA ELEGANS*, n. sp. (Plate II. fig. 1.)

♂ ♀. Allied to the preceding species (with which it agrees in size) and to *C. theylia*. The male may at once be distinguished from both by its much more acute and narrow primaries; and both sexes may be distinguished by having a distinct, whitely brown, longitudinal band from the back of the head to the end of the abdomen, the pterygodes more brightly coloured, and the anal margin of secondaries less excavated. In size it exceeds *C. theylia* by about one half; and the white nebula at anal angle of secondaries is more vivid; on the underside of primaries the terminal grey border is well marked. Expanse of wings, ♂ 2 inches 9 lines, ♀ 3 inches 1 line.

♂, Java (*Horsfield*); ♀, Silhet (*Stainsforth*). Type, B.M.

Mr. Walker says that "*C. eson* in Asia is very generally of small size, and in Africa of large size, but the latter variety also occurs in Asia," *C. eson* and *C. gracilis* being the large African forms, *C. elegans* the large Asiatic and *C. theylia* the small Asiatic form.

15. *CHÆROCAMPA ARGENTATA*, n. sp. (Plate II. fig. 3.)

General form and markings of *C. oldenlandia*, wings shorter, inner margin of primaries much more excavated, all the brown markings much darker, the silver lines more vivid, the line down the centre of pterygodes and the lateral streaks of abdomen vivid golden sprinkled with reddish scales; primaries more silvery at base, the pale oblique bar of primaries slightly broader, the outer margin somewhat plumbaginous; secondaries darker, the pale streak redder in tint; wings below altogether redder, the markings darker, the outer margin more plumbaginous; abdomen with a white ventral streak. Expanse of wings 2 inches 10 lines.

Moreton Bay (*Gibbon*), N. Australia (*Elsey*), Sydney (*Lambert*), Australia (*Stevenson*). Type, B.M.

This is the Australian representative of *C. oldenlandia*; it is undoubtedly a distinct species, but may be an insect described by Mr. Walker of which I cannot find the type. A third species also exists in North Australia; but our example is in such a poor condition that I could not venture to make a type of it.

16. *CHÆROCAMPA VIRESCENS*, n. sp.

Form, size, and general appearance of *C. crotonis*, but primaries greener, with only the outer, central, broader streak (running from inner margin to apex) distinct, the other lines scarcely visible; yellow spots of secondaries paler, outer margin greener; body greener, without the longitudinal central whitish streak; wings below redder, primaries without the postmedian oblique blackish line; the subapical spots smaller; discocellular spot white; outer margin broadly bordered with reddish grey; base more broadly suffused with blackish; secondaries with central lines very indistinct, reddish; body below irrorated with ferruginous, abdomen with a longitudinal pink streak. Expanse of wings 3 inches 2 lines.

Bogota (*Stevens*).

Type, B.M.

Intermediate in some respects between *C. crotonis* and *C. aristor*.

17. *CHÆROCAMPA DOCILIS*, n. sp.

♂. Allied to *C. amadis*; wings above dull green; primaries with an interno-basal black spot; a minute discocellular black spot; a basi-subcostal spot, a transverse oblique streak crossing the middle of discoidal cell, a nebula just beyond discoidal cell, a transverse subapical litta, an oblique streak (edged internally with silver-grey), and a submarginal row of spots, all olive-brown; a zigzag submarginal greenish-grey line, margined internally with silver-grey; outer margin from zigzag line silver-grey, irrorated with blackish atoms; fringe pinkish, except at external angle, where it is cream-coloured; secondaries with the basal three fifths and a broad submarginal band tapering to and not extending beyond first median branch, black; abdominal area yellowish; head olive-green, whity brown at the sides; thorax olive-green, with a broad central and narrower lateral grey streaks; abdomen clay-coloured, pinkish at the sides, irrorated with black atoms; a double central series of blackish points, as in *C. nitidula*; basal segment olive-green, greyish in the centre, with a large lateral black spot; antennæ cream-coloured; wings below brick-red, irrorated with grey, outer margin irregularly sericeous whity brown; a discal series of black points; primaries with the costa yellow; a blackish subcuneiform patch from base through centre of cell to just beyond discocellulars; two subcostal black spots near apex; secondaries with the costa yellowish, abdominal area whitish; body pink, irrorated with blackish atoms; abdomen with a lateral row of black points; thorax at base of wings golden-yellow; legs pale olivaceous, tibiæ and tarsi of front pair white. Expanse of wings 3 inches 11 lines.

Ecuador (*Buckley*).

Type, B.M.

This is a softly coloured and beautiful species.

18. *CHÆROCAMPA HAITENSIS*, n. sp.

♂ ♀. Allied to *C. nechus*; differs in having the external area of primaries browner, the pale-brown patch towards external angle broader; the sulphur-yellow spots of secondaries smaller; the lateral

yellow streak of abdomen replaced by a beautifully shaded, apparently overlapping, series of pyriform yellow and orange spots; wings below altogether redder, the dark areas more restricted and paler, the yellowish markings less vivid, and varied with red; palpi, prothorax, and sides of abdomen irrorated with red. Expanse of wings 3 inches 4 to 6 lines.

Haiti (*Tweedie*).

Type, B.M.

Easily distinguished at a glance by the colouring of the abdomen.

19. *CHÆROCAMPA IGNEA*, n. sp. (Plate I. fig. 4.)

♀. Allied to *C. scrofa*, but primaries and body dull reddish chocolate instead of blackish grey; primaries with all the markings less prominent; wings below bright reddish all over instead of only on basal half of primaries, the outer margins broadly clouded with brownish; body red-brown instead of greyish; palpi and legs varied with white, as in *C. scrofa*. Expanse of wings 2 inches 8 lines.

Moreton Bay (*Gibbons*).

Type, B.M.

Although nearly allied to *C. scrofa*, I believe that this species will prove to be constant and therefore distinct; I consider the most important difference to be the coloration of the under surface of the primaries.

Genus *AMBULYX*, Walker.

20. *AMBULYX MOOREI* (Boisduval, MS.).

♀. Primaries above dark clay-colour; outer margin broadly brownish, bordered internally by a diffused ochreous line deeper externally than internally, becoming silver-grey towards apex, and limited on internal margin by a brown spot (decreasing upwards, excavated on both sides), and on second and third median branches by indistinct brown dots; a nebulous, oblique, pale brownish sub-apical streak; several very ill-defined, sinuated, transverse, ochreous lines across and beyond the cell; a geminate, grey, white-pupilled discocellular spot; secondaries testaceous, clouded with clay-colour, especially towards anal angle; costa and abdominal margin creamy; a greyish streak across the end of the cell; an arched discal series of six red-brown lunate spots; outer margin red-brown: body bright clay-coloured; crest, metathorax, and a bar across pterygodes red-brown: wings below ochreous, becoming tawny externally; primaries with the outer margin grey, with a white external and brown internal line; an indistinct discocellular brown litura; several very indistinct brownish transverse lines beyond the cell; secondaries with the outer margin brown; an indistinct discocellular litura and several ill-defined spots beyond the cell pale brown; body below bright ochreous, becoming tawny towards head. Expanse of wings 3 inches 11 lines.

Java (*Horsfield*).

Type, B.M.

Most like *A. strigilis* in appearance.

21. *AMBULYX MARGINATA*, n. sp.

Primaries above whitish brown, with a pink tinge; base, two

large spots placed obliquely to each other (one costal, the other interno-basal), encircled at a little distance by a slender line, a very oblique transverse line from middle of costa to basal third of inner margin, a large oval spot near base of first median interspace, three central costal spots (nearly equidistant), a large, subquadrate, subapical costal spot, the outer margin broadly, from subapical margin to external fourth of inner margin, a discal nebula on second median interspace, and several indistinct, lunated, transverse lines, olive-brown; secondaries rosy, costa and base cream-coloured; abdominal margin broadly creamy, tinted with pink; outer margin, from subcostal nervure to anal angle, broadly chocolate-brown; two central, transverse, lunulated, grey lines and a discal series of grey dots; body as in *A. gannascus*: wings below altogether yellower than above; primaries with the costa, especially at apex, ochreous; all the large spots, excepting the subapical costal one, missing, the latter paler than above; transverse streaks more distinct; outer margin broadly bordered with silver-grey; secondaries pale clay-coloured; border, lines, and spots as above, but very pale; body as in *A. gannascus*. Expanse of wings 4 inches 7 lines.

Rio Janeiro (*Stevens*).

Type, B.M.

#### Subfamily SPHINGINÆ.

#### Genus AMPHONYX, Poey.

##### 22. AMPHONYX RIVULARIS, n. sp.

♂. Like a large example of *A. duponchel* ♂, but less green in colour, and with a broader transparent area in the secondaries. Expanse of wings 5 inches.

♀. Like the female of *A. duponchel*, but slightly larger, the primaries green, not varied with mealy-white patches, and with all the markings distinct as in *A. antæus* ♀. Expanse of wings 6 inches 3 lines.

♂ ♀, —?; ♂, *Ega* (*Bates*); ♂ var., —? (abdomen reddish).

Type, B.M.

I have little doubt that this is the Upper-Amazon representative of *A. antæus*, as *A. medor*\* is the Mexican. Herr Julius Flohr, of Hamburg (who has collected much in Mexico), tells me that he has a female example of the latter species measuring 9 inches in expanse of wing; our female only measures 7 inches.

#### Genus PROTOPARCE†, Burmeister.

##### 23. PROTOPARCE FULVINOTATA, n. sp.

Primaries above very similar to *P. solani*, but lighter, the subapical pale patch less dusky and broader, and all the transverse dark lines

\* Cramer's locality is (almost certainly) incorrect; we possess both sexes of his species, distinguished at a glance by its blackish coloration.

† I adopt this name, rather than Mr. Grote's emendation of *Macrosila*, as being one year prior to that genus as first characterized, its type also being indicated as *P. rustica*. For *Macrosila*, Walker, I have retained *M. incisa*, Walker, as type.

less oblique towards inner margin; secondaries bright ochreous, a subbasal lunule, a broad, transverse, central streak, and a broad marginal border dark brown: body—head chocolate-brown; thorax ferruginous, with posterior black border; abdomen red-brown, irrorated with grey, and spotted at the sides with elongated fulvous spots or lituræ; antennæ whitish above, dull ochraceous below: wings below brown, whitish towards base; fringe white-spotted; interno-basal area of primaries ochreous; abdominal area of secondaries whitish; body below sordid white. Expanse of wings 4 inches 2 lines.

South Africa.

Type, B.M.

24. *PROTOPARCE CONTRACTA*, n. sp.

♂. Allied to *P. lucetius*; primaries narrower, secondaries shorter, colouring slightly paler, the oblique lines of primaries much less irregular; submarginal line and apical patch much whiter; secondaries with the second brown band running independently across the wing instead of losing itself in the third band, marginal band narrower; orange lateral spots on the body much more rounded, a dorsal blackish line; mesothorax not black; primaries below with the transverse lines more oblique and better defined; secondaries with the transverse lines wider apart, more dentated; marginal border much narrower. Expanse of wings 4 inches 1 line.

Rio Janeiro (*Stevens*).

Type, B.M.

Confounded with *P. carolina* by Mr. Walker.

Genus *DILUDIA*, Grote and Robinson.

25. *DILUDIA BREVIMARGO*, n. sp.

♀. Closely allied to *D. florestan*, but differing as follows:—Smaller; primaries with the outer margin much shorter, more rounded at apex; secondaries also shorter, outer margin excavated above anal angle: in colours it differs in having the primaries much greyer in tint, the transverse bands greener, the marginal black lines of these bands more distinct and more strongly dentated; the black bars on median branches less strongly defined; the apical black-edged area narrower, and very indistinctly sinuated externally; secondaries with the inner transverse black bar very indistinct: body with the head and thorax greenish grey, abdomen less red; marginal black strigæ less strongly defined; wings below darker than in *D. florestan*, transverse bars less distinct and more irregular, the two inner bars of secondaries coalescing. Expanse of wings 4 inches 6 lines.

Brazil (*Becker*).

B.M.

26. *DILUDIA RUFESCENS*, n. sp.

♀. Allied to *D. lichenea*, primaries altogether redder; the outer margin shorter, more arched; central band much better defined, its outer edge much more dentated; apical patch more elongated; submarginal white streak much more deeply sinuated; secondaries shorter, pale grey, with two indistinct central whitish bars: body more uniform in colouring, head and collar rather redder; lateral

abdominal black strigæ less defined: wings below altogether paler than *D. lichenea*, the transverse bars less defined, only two on secondaries. Expanse of wings 5 inches 3 lines.

Rio (*Stevens*).

Type, B.M.

Placed by Mr. Walker with *D. lichenea* and described in his first paragraph as the female of that species, the true female being described more briefly in the second paragraph.

27. *DILUDIA MELANOMERA*, n. sp.

♂. Wings slightly more elongate, altogether much darker; the apical patch black, with a zigzag grey line running longitudinally through it; median band externally bordered and spotted at end of cell with black; submarginal spots black instead of dark grey; secondaries black-brown, a slight double nebulous streak from anal angle: body much darker, head and prothorax blackish; abdomen with lateral bars more continuous and blacker: wings below also darker, transverse lines much darker, more dentate; body below rather paler. Expanse of wings 4 inches 10 lines.

Silhet (*Dale*).

Type, B.M.

This appears to be the northern form of *D. discistriga*.

28. *DILUDIA VATES*, n. sp.

Primaries above light grey, two or three whitish spots on basal half of costa and at centre of discoidal cell, also a double angulated discal series of brownish-edged lunate spots; a small oblique spot towards middle of costa, a less oblique litura crossing the cell near its termination, two parallel streaks within interspaces, a small lunule beneath them, an irregular streak margining the apical patch, and a series of spots at the end of the nervures upon the fringe black-brown; an indistinct discal series of brown dots; fringe partly white; secondaries smoky brown, abdominal area paler; costa testaceous, anal angle grey, crossed by two brown lunules; thorax and head grey; pterygodes margined externally by a black streak; metathorax margined behind by a transverse angulated black streak; abdomen pale brown, with a brownish lateral streak and a dorsal black line: wings below whitish brown, external area and a discal bar slightly darker brown; fringe spotted with blackish; palpi varied with white, pectus white; abdomen whitish brown; tarsi of front pair of legs blackish. Expanse of wings 3 inches 6 lines to 4 inches.

Ceylon (*Templeton*); Madras.

Type, B.M.

*Var.* Slightly darker, a geminate white spot near external angle of primaries. Expanse of wings 4 inches 4-9 lines.

Silhet (*Sowerby*), Moulmein (*Clerck*).

Type, B.M.

Our example from Madras has a label on it, bearing the MS. name *Sphinx vates*. The species is nearly allied to *D. incerta* of Walker, from China; it was confounded, in the collection, with *D. discistriga*.

29. *DILUDIA NATALENSIS* n. sp.

Primaries above snow-white, varied with grey, two transverse

irregular brownish lines crossing the middle of cell; a broad greyish patch, beginning just before end of cell, bounded internally by a blackish streak, and bounded and crossed externally by two lunulated waved transverse lines running from costa to inner margin; two similar discal lines, becoming black below third median branch; a very irregular black streak bounding the apical patch, and immediately below it two interrupted blackish lunules; a central submarginal bifid black-edged grey spot; an ill-defined submarginal streak; a white discocellular spot; outer margin black-spotted; secondaries smoky brown; abdominal area testaceous; outer margin dark brown, broadest at apex; a pyriform dark brown streak on abdominal area, continued laterally as an indistinct brown streak crossing the centre of wing; anal angle white, interrupted by two marginal semicircular blackish spots and an irregular submarginal grey streak: thorax pale grey, collar dark grey behind, pterygodes bordered externally with black; metathorax margined behind with blackish; abdomen whity brown, with lateral oblique dark grey and white strigæ on each segment: wings below tinted with ferruginous, a common lunulate and waved discal streak; primaries with a black costal streak just beyond the end of cell; an interrupted submacular brown streak just beyond the discal streak, an oblique white spot at apex; fringe spotted with brown; secondaries crossed above the middle by an oblique diffused brown bar; a brown streak at apex and anal angle, fringe spotted with ferruginous; body whity brown, palpi and pectus white. Expanse of wings 5 inches.

Port Natal (*Gueinzius*).

Type, B.M.

This species somewhat resembles the preceding in general appearance; but the outer margin of primaries, instead of being convex, is distinctly excavated above external angle. Our example bears a label by the collector bearing the following inscription:—"*Acherontia spei* ♂. Only two ♀ specimens taken in 1857 (one of them lost). I have not observed that peculiar chirping noise; had they chirped I am sure I would have observed. Query, Does the ♂ only chirp? and the ♀ not?—*W. Gzs.*"

I have not thought the MS. name applicable, and therefore have not used it.

#### Genus NEPHELE, Hübner.

##### 30. NEPHELE ROSE, n. sp.

Wings above olive-green; primaries with the base, a broad transverse band leaving a large quadrate costal spot, a small spot between the latter and the base upon inner margin, and an irregular band beginning broad at apex, undulated and narrowed externally to upper radial, then abruptly and deeply excavated to external angle, its inner edge straight and with a pale border, all dark brown; a postmedian squamose snow-white streak bounding the broad subcentral transverse band; a snow-white point on lower discocellular, and two at base; secondaries with the costal area testaceous; apical half of wing dark brown; fringe testaceous; body olive-green, head greyish brown; abdomen paler at the sides, with five transverse



black bars, the first three broadly interrupted in the middle; anal tuft red-brown; antennæ testaceous: wings below altogether paler and browner than above, the transverse white streak and basal points of primaries absent, discocellular point smaller, secondaries crossed by three central brown lines; body below sordid whitish, pectus greyish. Expanse of wings 4 inches 1 line.

"Boma, Feb. 1873" (*Monteiro*).

Type, B.M.

This handsome new species is allied to *N. ænopion*; it was the only example taken, and was, I believe, captured by Mrs. Monteiro, after whom I have named it.

### 31. *NEPHELE VARIEGATA*, n. sp.

Primaries—base of wings grey-brown, varied with clay-colour, with two discoidal whitish dots, bounded externally by an irregular transverse grey-clouded whitish band, divided through the centre by a blackish line; a broad central oblique greyish brown band, varied with clay-colour, bounded on each side by two irregular black lines and constricted in the middle; three silver spots at end of cell; immediately beyond the central band is a narrower band, whitish at costa, otherwise grey, intersected and bounded externally by lunated blackish lines; discal area ochreous towards costa, otherwise dark brown varied with clay-colour, a very irregular undulated submarginal blackish line bordered externally by a grey line; outer margin reddish brown; secondaries olive-green, outer margin (except at anal angle) with a broad brown border tapering from costa to submedian nervure; fringe testaceous: body dark brown, pterygodes tipped with pale yellow scales; abdomen with six broad transverse lateral black bars separated by pale yellow lines; primaries below brown, dull olivaceous at base, crossed at the middle by an oblique nebulous dark brown bar, disk crossed by two waved undulated dark brown lines, and an arched undulated submarginal line; a white discocellular point; secondaries pale olivaceous, with the outer margin brown, three central undulated and a submarginal irregular dark brown lines; body greyish brown, palpi paler. Expanse of wings 3 inches 7 lines.

Congo (*Richardson*), Africa (*Milne*).

Type, B.M.

This is *Z. peneus* (part.) of Walker, *Z. funebris*, Boisd. (nec Fabricius).

### Subfamily SMERINTHINÆ.

#### Genus *LEUCOPHLEBIA*, Westwood.

### 32. *LEUCOPHLEBIA ROSACEA*, n. sp. (Plate II. fig. 4.)

♂. Allied to *L. lineata*; primaries dull glossy rose-colour, a broad ochreous streak parallel to costa, broadest opposite external angle, and acutely pointed at each end; an oblique submedian basal ochreous streak, median branches silver; fringe golden; secondaries deep ochreous, fringe testaceous; body—palpi and vertex chocolate-brown, back of head and sides of thorax pale sordid rose-colour; centre of thorax chocolate-brown; abdomen pale brown; antennæ cream-coloured above, ferruginous below; wings below as in *L.*

*lineata*, but altogether deeper in colour, and with a slender marginal plum-coloured line; body and legs below chocolate-brown, abdomen with a rosy tint. Expanse of wings 2 inches 7 lines.

Coimbatore (*Walhouse*).

Type, B.M.

33. *LEUCOPHLEBIA BICOLOR*, n. sp. (Plate II. fig. 5.)

♂. Primaries rosy, a broad central longitudinal tapering stramineous streak from base to apex, nearly straight in front, arched behind, and having three processes along the median branches; fringe stramineous; secondaries ochreous; costa and abdominal margin stramineous, outer margin rosy, fringe stramineous; thorax dull rosy, deeper in front than behind, with a central ochreous spot: body whitish ochraceous, rosy at the margins; antennae above creamy whitish, below brownish: wings below stramineous; primaries with discoidal area ochreous; apical costa abruptly and broadly rosy, outer margin with a broad pale rosy border, tapering to apex; secondaries with costa and outer margin pale rosy; body dull pale ochraceous, with a rosy tint, gradually becoming more intense to the head; palpi dull rosy; legs creamy above, rosy below. Expanse of wings 2 inches 2-3 lines.

Almorah (*Boys*), N. India.

Type, B.M.

Allied to *L. emittens*, but coloured more like *L. lineata*.

EXPLANATION OF PLATES I. & II.

PLATE I.

- Fig. 1. *Macroglossa proxima*, p. 4.  
 2. — *obscura*, p. 5.  
 3. — *fervens*, p. 4.  
 4. *Cherocampa ignea*, p. 10.  
 5. *Callionyma lutescens*, p. 5.  
 6. *Macroglossa nox*, p. 5.

PLATE II.

- Fig. 1. *Cherocampa elegans*, p. 8.  
 2. — *gracilis*, p. 8.  
 3. — *argentata*, p. 8.  
 4. *Leucophlebia rosacea*, p. 15.  
 5. — *bicolor*, p. 16.

2. Corrections of and Additions to "Raptorial Birds of North-western India." By ANDREW ANDERSON, F.Z.S.

[Received November 30, 1874.]

(Plate III.)

Since the publication of my last paper\*, my knowledge of this subject generally has been greatly advanced, not only by further research, but by the acquisition of European and African specimens of some of the species concerning which comparatively little was known

\* P. Z. S. 1872, p. 619.

up to that date. The result is that I, or rather ornithologists generally, have to acknowledge certain errors consequent on a limited knowledge of a most difficult group of birds. At the same time I am glad to be able to introduce several new species as occurring in the country to which my observations have been confined, viz. the *deltaic* portion of the North-western Provinces, thus making (with the necessary corrections and additions) no less than 48 species of Raptore known to occur in this district.

This is the number that have as yet come under *my own* observation. But further investigation will doubtless enable me to add several more, such as *Falco babylonicus*, *Haliaetus plumbeus*, &c.

Additions to former lists are indicated by an asterisk, \*.

### 1. VULTUR MONACHUS, Linn.

All the specimens examined by me have a light fulvous nuchal patch, almost white; but the authors of the 'Birds of Europe' do not allude to this peculiarity in the Indian bird, nor is it shown in the plate.

### 2. VULTUR CALVUS, Scop.

On the 15th of July, 1872, my friend Mr. Spry took an egg, flushing the bird off her nest, which also contained an egg of *Falco jugger*.

### \*3 bis. GYPS FULVESCENS, Hume.

The large fulvous-coloured Vulture already alluded to I identify as belonging to this species, and not to *G. himalayensis* of the same author.

### 5. GYPS BENGALENSIS, Gm.

Last cold season I found a small colony of these Vultures breeding on a clump of high cocoa-nut palms (*Cocos nucifera*), whence I obtained four eggs. I have also lately taken *three* eggs from *one* nest, and *two* from another, but of course not the produce of the same birds. The tree on which these nests were built was the rendezvous of a large assemblage of these useful birds, which were attracted to this solitary tree by the carcass of one of the mail-cart horses which had died on the roadside.

### 6. NEOPHRON GINGINIANUS, Lath.

Captain Beagin, of H.M. 105th Regiment, has lately sent me a series of Neophrons from Aden, which appear to be referable to the African form *N. perenopterus*, Linn. The skins are badly put up, and they are not sexed; so that the minute differences pointed out by Blyth† cannot be compared with Indian examples. The series comprises both black-billed and black-clawed examples, which predominate, as well as white ones, so that this one difference cannot seemingly hold good; but the corneous portion of the bill, as well as the claws, when black are certainly of a much *deeper black* in the Aden

† Cf. 'Ibis' for 1866, p. 233.

than in any Indian-killed examples having the same peculiarity; and in India, according to my experience, the opposite variety, viz. the white-billed ones, predominate. There is no reason why both forms should not intermingle at Aden. The specimens I allude to have their claws quite worn away, caused, no doubt, by the rocky nature of the ground.

#### 8. *FALCO PEREGRINUS*, Gmel.

On the 11th of February last I saw a Peregrine actually hunting by moonlight: the full moon was high up in the sky; and several stars had been visible for fully half an hour. Returning homewards to my camp through a marsh, I was startled by the sudden appearance of some ducks (*Anas pæcilorhyncha*), which dived simultaneously with their splash into the water. The Falcon towered overhead and then flew backwards and forwards several times over the same ground, almost skimming the surface of the water.

The following morning I had several shots at this bird, but without success; the native fowlers who were engaged in netting wild fowl assured me that they had seen her at that one place for a long time, and that she invariably roosted on a large bough of a mango tree, close to the edge of the jheel.

The crepuscular habits of this Falcon have not been recorded before, so far as I am aware of.

#### 9. *FALCO PEREGRINATOR*, Sund.

On the 19th of November last I procured another specimen of this beautiful Falcon, making in all three females. This appears to be a fully adult bird: the head, nape, and cheek-stripe are almost black, and only one or two feathers are wanting to make it into "*atriceps*" of Hume; upper plumage generally slaty blue, getting lighter towards the tail-coverts, the whole of the feathers being more or less barred with blue of a darker shade; tail unicolorous with the back, and barred with dark slaty blue; chin, throat, and upper breast unspotted white, tinged with buff; from sternum downwards bright ferruginous rufous, barred on the flanks, and spotted on the abdomen with slaty blue; tibial plumes greyish, tinged with lavender, and minutely barred with blue of a light shade.

The Shaheen alluded to in a former paper (P. Z. S. 1871, p. 678) is an immature bird: the whole of the upper plumage generally, including the tail, is dark cinereous or dusky black, the feathers of the back being edged with rufous, and the tail barred with the same colour; the upper tail-coverts are blue, thus indicating a transitional stage; chin, throat, and upper breast as in the mature bird, but the feathers are dark-shafted; lower breast, flanks, sternum, and tibials bright ferruginous rufous, the breast and flanks having longitudinal brown stripes, the sternum and tibials slightly barred with light blue.

Of the varied country of the Doab the enormous jheels, woods, and plains have each its representative Falcon: the Bhyree affects swamps, the Shaheen wooded regions, especially in the vicinity of

large trees, where Pigeons and Parrots are in the habit of roosting, while the Jugger delights in dry plains.

#### 16. LITHOFALCO CHICQUERA, Daud.

At Jelallabad, in the Shabjehanpore district, I came across three pairs of these Falcons, which were nesting within sight of each other; two of them had built on trees only a few yards apart. These nests contained one and two eggs each; and although I halted for the express purpose of obtaining full clutches, the Crows forestalled me. One nest escaped from these marauders, and enables me to add something new in the domestic economy of the Toorumptee; for in this instance she had appropriated an old nest of the Crow.

#### 23. MICRONISUS BADIUS, Gm.

In modification of any former experience, I have now to record the occurrence of a *slightly* marked egg from a clutch of three.

Five out of six nests which were taken in my presence this last summer were built on the parasitical shrub (*Loranthus globosus*?) which grows to such perfection on mango trees. The branches of this so-called mistletoe radiate sideways and upwards to a considerable height above the parent tree, from a large excrescence or knob, thus forming, as it were, the outer structure of a ready made nest. Viewed from below the nest looks about the size of what the common Crow would build; but on examining one I had cut down (the parasitical plant was four feet above the tree), it was clear that the nest itself was particularly small, and so clumsily made as to fall to pieces on being removed from the knob which supported it. A better situation for a nest than the centre of a clump of this parasite could hardly be conceived.

#### \*25. ACCIPITER VIRGATUS, Temm.

On the 3rd of October last a Shikaree brought me a living Hawk, which he had just captured with bird-lime, and which is undoubtedly referable to this species. It is the first capture of this interesting bird that I have heard of in this part of the country. The person from whom I got it tells me that the Besrah is frequently trapped early in the winter. They certainly must pass through the plains on their southward migration, as Wallace gives it from Malacca, Java, and Sumatra, and Hume has recently recorded it from the Andamans.

Not wishing to be too confident of my own identification, I have waited till the acquisition of more examples, and the opinion of ornithologists who had more experience than myself as regards *A. virgatus*, could be brought to bear on the subject. A pair kindly sent to me by Mr. Mandelli, of Darjeeling (and in precisely the same plumage as my own), leaves no further room for any doubts. Mr. Hume, too, who expressed a wish to see the birds I called "*A. virgatus*," has returned them to me with an expression of opinion to the effect that he fully concurs with me in my identification.

While the long, slender tarsi, diminutive bill, and more *game-looking* appearance of *A. virgatus* is sufficient to separate it from its plebeian ally *Micronisus badius*, the coloration of the *upper* plumage in the *young* birds of both species is very similar indeed, being what I should call the rufous-brown stage. All the feathers on the mantle are of a rich brown colour, tipped and edged with dark rufous, the edgings being broader in *A. virgatus* than in *M. badius*; the former differs also in having *four broad* caudal bands, while the latter has *five or six narrow* ones.

The *under* plumage of the two *juvenile* birds is very different in *A. virgatus*: from the chin to the vent it is a rich buff colour (Jerdon calls it white), the feathers of the neck, breast, and abdomen having longitudinal drops of *reddish* brown; the flanks and tibial plumes are broadly *barred* with the same colour; in *M. badius* the underparts are *white*, each feather having a central stripe of brown.

The plumage of the *adult* birds of both species differs *in toto*: the Darjeeling specimen has the head and back of a slaty black colour, the collar and tail being of a smoky brown; there are four caudal bands of the same hue as the head; the under plumage is *white*, *broadly* barred with *bright ferruginous*: the adult Shikra has the mantle of a light ashy grey; and the underparts are *minutely* barred with rufescent or fawn-coloured marks.

The bill in *A. virgatus* is very dark, almost black, the cere dark greenish yellow; in *M. badius* the bill is horny blue, and the cere yellow, without any green; the legs and feet in the former are greenish yellow, the back of the tarsi and soles being yellow; in the latter these are yellow without any tinge of green. The subjoined table of measurements of an immature male of each species will be found useful:—

Species.	Length. in.	Wing. in.	Tail. in.	Tarsus. in.	Foot,	
					greatest length. in.	greatest breadth. in.
<i>Accipiter virgatus</i>	10·5	6·3	5·3	2·1	2·6	2·3
<i>Micronisus badius</i>	12·0	7·0	6·0	1·8	2·6	2·1

27. AQUILA MOGILNIK, J. G. Gmel. (= *A. crassipes*, Hodg. MS.\*).

On the 8th of March last I procured a third example of the *Eastern Imperial Eagle* in the *transitional* stage, a huge female of the following dimensions:—Length 32·5; wing 23·5; tail 13; expanse 7 feet; tarsus 4·2, thence to end of mid claw, along the curve, 4·1, outer claw *as above* 3·2, inner claw 3·8, hind claw 3·6; expanse of foot (length) 6·5, (breadth) 5·5; bill along curve 3; height of both mandibles at base 1·2, width at gape 2·2. Weight just over 9 lb. This specimen, while yet in the striated stage, has several retrices of the adult bird, and the breast has assumed a black-brown appearance in patches. In the course of a very short time this bird would have become exactly similar to No. 4 of Mr. Dresser's series (see his

\* Cf. 'Ibis' for 1873 p. 99.

article on this Eagle), *i. e.* the adult bird *minus* the white scapulars.

The first two changing Imperials which proved the key towards the solution of this (hitherto) vexed question\* are now in the Norwich Museum, and form Nos. 2 & 3 of the series alluded to at p. 2 of 'Birds of Europe.'

The Abyssinian Eagle referred to by Dr. Finsch under the term "*imperialis*"† is of course *A. mogilnik*. Very recently an immature example of the same bird was sent to me from Aden; it flew against the telegraph-wire and was captured alive.

### 27 *bis*. AQUILA BIFASCIATA, Gray & Hard.

On account of the recent discussion that has taken place‡ relative to the distinctness or otherwise of *A. orientalis* from *A. bifasciata*, I have secured a very fine series of this Eagle. The acquisition, too, of several specimens of this bird from Russia (labelled *A. clanga*, by which term it is known to continental naturalists) has afforded Mr. Brooks and myself another opportunity of reexamining the large series at our command; and we still hold to our former opinion, viz. that as regards coloration in every phase of plumage, including the adult bird with the nuchal buff patch, the two Eagles are *identical*.

It is true that the European-killed examples we examined are a *trifle smaller*, the wing-measurements of the males being *half* an inch and in the case of females *one* inch less than Indian specimens. But against this (admitted) trivial difference, as regards size, in a bird measuring up to 32 inches in length, it should be borne in mind (1) that no reliance can be placed on the sexing of birds that are obtained from dealers (especially in *this* Eagle, for I have repeatedly found large males running into females), and (2) that in all probability the smallest specimens are sent out to this country, the largest, and consequently the best in the estimation of dealers, being retained for European collections. Colour is another point mooted by Mr. Gurney; but this really goes for nothing, seeing that in this country we have *dark* birds as well as light-coloured ones; and I possess specimens that have been bleached to a rufescent sandy colour.

Mr. Gurney has been so good as to inform me that he has reexamined the type of *Aquila amurensis*, Swinhoe, and that he has no doubt that it is an adult female of *A. bifasciata*. Such being the case, the wing-measurement as given by Mr. Swinhoe§, viz. 26½ inches, must surely be wrong; for I have never yet seen more than a 24-inch wing in this Eagle.

Referring to the concluding portion of Mr. Gurney's letter in 'The Ibis' for 1873, page 99, I may mention having recently sent to him a very fine female *A. bifasciata* in the phase of plumage he therein alludes to. The peculiarity observed by Mr. Gurney is more more or less common in all immature birds; and the specimen I have sent to

\* Cf. P. Z. S. 1872, pp. 620 & 621. † Cf. Trans. Z. S. vol. vii. p. 201.

‡ Cf. 'Ibis' 1873, pp. 422 & 423, and 'Stray Feathers,' vol. i. p. 325.

§ Cf. P. Z. S. 1871, p. 338.

him, though freely "*barred with alternate bands of white and stone-coloured brown, &c.*," on the under surface from the sternum to the vent, has the fulvous nuchal patch nearly fully developed, thus showing that in Eagles no fixed rule can be laid down as regards the successive phases of plumage, and that some birds may develop signs of maturity while yet retaining their juvenile garb.

#### 28. *AQUILA NÆVIA*, Gm.

Specimens of this Eagle from Russia, kindly sent to me by Dr. Crowfoot of Beccles (to whom I am also indebted for *A. bifasciata*), are identical in every respect with Indian birds.

In my former papers I alluded to only two stages of plumage, viz. the "*spotted*," and the "*uniform brown*." I now find that very young birds (judging from the amount of spots on them) have the under surface striped or lineated in exactly the same manner as the young of *A. hastata*. I also possess a remarkably fine specimen of *A. nævia* without a single spot, which has the head and neck of a pale sandy colour, almost white.

#### 29. *AQUILA VINDHIANA*, Frank. (= *A. fulvescens*, Gray, *apud* Jerdon\*).

This Eagle has now had its proper name restored to it—the term "*fulvescens*" (by which it has hitherto been known) having been applied to a very different bird, and one with which (until very recently) the true African *A. nævioides* had been confounded. I can corroborate what Mr. Brooks has already written on this subject, viz. that "*no two Eagles could be more truly distinct* (than *A. vindhiana* and *A. nævioides*), *though they are closely affine and structurally alike*," as I have recently examined the bird sent to him by Dr. Tristram along with a very fine South-African example which Mr. Gurney has been so kind as to forward to me.

*Aquila vindhiana* and *A. fulvescens*, according to our present knowledge, are purely Indian, while *A. nævioides* (*vera*) does not occur in India.

#### 29 bis. *AQUILA FULVESCENS* (*vera*), Gray,

is the bird that has hitherto been wrongly identified with the true *Aquila nævioides* (Cuv.), and which does not occur in India. The Abyssinian Eagles alluded to by Finch and Blanford† under the synonyms of "*rapax*" and "*albicans*" (= "*nævioides*," Cuv.) require further examination with reference to our present knowledge of the subject. Neither of these authors refers to the *party-coloured* plumage which is so characteristic of this fine bird.

*Aquila fulvescens* is certainly the rarest Eagle in India; and we are in profound ignorance of its summer habitat, nidification, &c. I have not heard of another capture since the *ten* that were recorded in my former paper (P. Z. S. 1871, p. 688).

\* Cf. 'Stray Feathers,' vol. i. p. 463.

† Cf. T. Z. S. vol. vii. p. 201, and 'Geol. & Zool. of Abyssinia,' p. 295.



30. *AQUILA HASTATA*, Less. (Plate III. figs. 1 & 2.)

An account of the nidification of this Eagle has already appeared in 'The Ibis;' and the nestlings which I brought down from Saharunpore enable me to supply the missing link as regards the early stages in the plumage of this interesting bird.

Besides the three already referred to, I have recently had an opportunity of examining two more which Mr. Brooks has this season taken from their nests; and as the young birds appear to be subject to a good deal of variation in the amount and distribution of their spots &c., I proceed to give *general characters* instead of confining myself to the description of a *single* specimen only.

*Description of fully-plumaged nestling between three and four months old.*—Length 23·5 inches, wing 16·5, tail 9·5, tarsus 3·7 (bird apparently not fully grown). Bill black, plumbeous blue towards the base; cere and gape bright yellow; feet dull yellow; claws black; irides dark brown.

Above rich glossy brown; feathers on the top of the head and hind neck tipped with fulvous; upper tail-coverts light brown, barred with white; scapulars, ridge, bend of wings, and wing-coverts tipped with fulvous spots of a larger size; wing on being opened out shows two, and sometimes three bands, caused (as the case may be) by the greater wing-coverts, secondaries, and tertials being broadly edged with fulvous and greyish white, shaded off in the latter into the darker part of the feathers; primaries uniform black; secondaries brown, profusely barred with hoary grey; tertials pale brown, similarly barred and broadly edged with greyish white; tail dark brown, broadly edged with greyish white, and barred with dark grey.

Beneath brown, the pectoral and abdominal feathers having central and terminal stripes of rich fulvous; the under tail-coverts and tibial plumes are broadly barred with fulvous of a lighter shade.

*Description of nestling after the first moult, when about eighteen months old.*—Colour of soft parts and dimensions the same; but the primaries and tail-feathers do not appear to be fully grown.

With the first moult the bird assumes a much darker colour throughout, and loses a good many of the spots on the wings and scapulars, but not those on the head; these, it seems, disappear gradually; and the "*entirely spotless*" stage (P. Z. S. 1872, p. 623), in all probability, is not assumed before the third or fourth moult. Although the bands on the wings have nearly vanished, the spots on the shoulders have reappeared in a more decided form, being larger, darker, and somewhat confluent along the ridge of the wings; the upper tail-coverts have become darker, and are now free from bars; the secondaries, tertials, and tail-feathers still retain the bars which are so characteristic of the younger stage; and these, too, may not wholly disappear before several moults.

The chief feature, however, in the second stage is the *disappearance of the striation on the under surface*; the colour below is now of a uniform dark brown, with the exception of the feathers between the thighs and the tibial plumes, which still retain a few indistinct fulvous transverse marks.

him, though freely "*barred with alternate bands of white and stone-coloured brown, &c.*," on the under surface from the sternum to the vent, has the fulvous nuchal patch nearly fully developed, thus showing that in Eagles no fixed rule can be laid down as regards the successive phases of plumage, and that some birds may develop signs of maturity while yet retaining their juvenile garb.

## 28. *AQUILA NÆVIA*, Gm.

Specimens of this Eagle from Russia, kindly sent to me by Dr. Crowfoot of Beccles (to whom I am also indebted for *A. bifasciata*), are identical in every respect with Indian birds.

In my former papers I alluded to only two stages of plumage, viz. the "*spotted*," and the "*uniform brown*." I now find that very young birds (judging from the amount of spots on them) have the under surface striped or lineated in exactly the same manner as the young of *A. hastata*. I also possess a remarkably fine specimen of *A. nævia* without a single spot, which has the head and neck of a pale sandy colour, almost white.

## 29. *AQUILA VINDHIANA*, Frank. (= *A. fulvescens*, Gray, *apud Jerdon*\*).

This Eagle has now had its proper name restored to it—the term "*fulvescens*" (by which it has hitherto been known) having been applied to a very different bird, and one with which (until very recently) the true African *A. nævioides* had been confounded. I can corroborate what Mr. Brooks has already written on this subject, viz. that "*no two Eagles could be more truly distinct (than A. vindhiana and A. nævioides), though they are closely affine and structurally alike*," as I have recently examined the bird sent to him by Dr. Tristram along with a very fine South-African example which Mr. Gurney has been so kind as to forward to me.

*Aquila vindhiana* and *A. fulvescens*, according to our present knowledge, are purely Indian, while *A. nævioides* (vera) does not occur in India.

## 29 bis. *AQUILA FULVESCENS* (vera), Gray,

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Above rich glossy brown; feathers on the top of the head and hind neck tipped with fulvous; upper tail-coverts light brown, barred with white; scapulars, ridge, bend of wings, and wing-coverts tipped with fulvous spots of a larger size; wing on being opened out shows two, and sometimes three bands, caused (as the case may be) by the greater wing-coverts, secondaries, and tertials being broadly edged with fulvous and greyish white, shaded off in the latter into the darker part of the feathers; primaries uniform black; secondaries brown, profusely barred with hoary grey; tertials pale brown, similarly barred and broadly edged with greyish white; tail dark brown, broadly edged with greyish white, and barred with dark grey.

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The chief feature, however, in the second stage is the *disappearance of the striation on the under surface*; the colour below is now of a uniform *dark* brown, with the exception of the feathers between the thighs and the tibial plumes, which still retain a few indistinct fulvous transverse marks.

The "*delicate yellow-brown*" stage (referred to P. Z. S. 1872, p. 622) is, after all, the plumage of the *juvenile or nestling bird*; for mine, while in confinement, began to fade, and to assume a very light colour (in the nestling plumage); and under the influence of the sun the change of course would have been far greater. The amount of spots, and even the striation below, in this early stage, is subject to considerable variation; it is only the nestling birds which turn "*yellow-brown*," as they are exposed to the influence of the sun and rain during the trying months of June to October before they are fully fledged; and in these faded or "*yellow-brown*" examples the spots and striæ are sometimes nearly wanting.

I may mention that I too pronounced the small Danzic bird, sent out to this country as *A. nævia* by Mr. Dresser, to be a fully adult example of *A. hastata*, without, at the time, knowing that Mr. Brooks had arrived at the same conclusion†.

\*31. *AQUILA PENNATA*, Gmel.

The capture of a beautiful adult male on the 22nd of January last enables me to throw some more light on the plumage of this little Eagle.

The three birds in my collection appear to me to come in the following order:—

No. 1 has the whole of the under surface of a uniform rich reddish brown, all the feathers with the exception of the tibial plumes being dark-shafted.

No. 2 has the throat and the upper breast buffy white, the feathers dark-shafted as in No. 1; lower breast and tibial plumes almost white, tinged with buff.

No. 3 has the throat, upper breast, sternum, and tibial plumes white, tinged with fulvous, the feathers generally broadly centred with rufous.

The signs of adolescence in this Eagle evidently show more in the under than in the upper surface; for no. 2 is certainly an older bird than no. 1, and yet the two, laid side by side, back uppermost, are quite inseparable. No. 3, which I take to be fully adult, has the head and neck of a rich reddish buff, the feathers on the occiput being broadly centred brown; the upper plumage generally is light brown, the wing-coverts and scapulars being broadly edged with buffy white. No. 2 has some brown feathers on the flanks, clearly indicating that the brown below is the early or first plumage. The following measurements will show the comparative dimensions of both sexes:—♀, length 21·5 inches, wing 16, tarsus 2·8; ♂, length 18·5, wing 14, tarsus 2·5.

38. *CIRCAËTUS GALLICUS*, Gmel.

I have lately sent an account of the breeding of this bird to Mr. Dresser.

† Cf. 'Stray Feathers' for 1873, p. 327.

I have had access to Mr. Hodgson's drawings, and find that while he has figured the *adult* bird under the name of "*tarsatus*," he does not appear to have seen specimens in the *striated* or *spotted* stages.

48. *POLIORNIS TEESA*, Frankl.

This Buzzard, as is well known, lays absolutely colourless eggs of the Goshawk type; the occurrence, therefore, of a clutch of coloured eggs will doubtless prove interesting to oologists. One of these eggs is *very well* marked with *reddish-brown blotches at the obtuse end, covering nearly half the surface of the egg*; the second is faintly marked with light greyish-brown spots at the small end, somewhat in the form of a zone; and the third has still fainter indications of colouring-matter at the same end.

50. *CIRCUS CYANEUS*, Linn.

Admitted into previous lists through an oversight.

51. *CIRCUS PALLIDUS*, Sykes.

I shot a fine male a few days ago in the act of carrying away a live Partridge.

This Harrier lives chiefly on small birds, and is more *game-like* than its congener, the Marsh-Harrier.

56. *MILVUS GOVINDA*, Sykes.

56 *bis*. *MILVUS MAJOR*, Hume (= *M. melanotis*, Temm.).

56 *tris*. *MILVUS PALUSTRIS*, nobis (= juv. *M. govinda*, Sykes).

I take this opportunity of withdrawing the "small Marsh-Kite" described at page 142, J. A. S. for 1873, as it appears to be the young of the common Govinda Kite, which is subject to considerable variation in size as well as in colour. We have, after all, only *two* species of Kite in India, viz. the large migratory one (*M. melanotis*) and the resident one (*M. govinda*).

Mr. Brooks is of opinion that Sykes's measurements refer to *M. melanotis*, and not to *M. govinda*, and that the term *M. affinis*, Gould, should be applied to the common resident bird. This may be correct enough; but I doubt whether this complicated nomenclature will be generally adopted.

\*74. *EPHIALTES PENNATUS*, Hodg.

\*74 *bis*. *EPHIALTES SUNIA*, Hodg.

Until specimens in a transitional stage have been procured, and their identity thus established, it appears advisable to keep these two little Owls distinct for the present. Of each species I have obtained three live specimens; the red ones are most lovely little creatures. They were caught with bird-lime in September and October last, during cloudy weather, when they seemed to sally forth in search of food at all hours of the day. I kept them alive in a large cage for nearly a week, in company with several *Ephialtes griseus*, feeding them on crickets, mice, and occasionally with raw meat.

My first red Scops was captured on 13th of September last, in the Station Park. Some boys, who were in the habit of catching birds for me by means of a long bamboo fishing-rod, the tip of which was forked and smeared with bird-lime, informed me in great haste (one

of them having remained behind to watch the bird) that they had just flushed a red Owl from the long grass in the park, and that the bird had flown into a tamarind-tree. Before shooting the bird, which I had come prepared to do, I consented, as a preliminary measure, to set their "*chou guddee*" trap, well covered with lime, and baited with a live mouse. Before five minutes had elapsed, the Owl was in my hands; and the little urchins were just as well pleased with their *tip* of four *anas* (=6*d.*) as I was with my prize.

As regards size and coloration of soft parts there is in reality no difference whatever between the two species—a fact certainly in favour of their identity, as the following table of measurements (and description) clearly shows:—

	Sex.	Length. in.	Wing. in.	Tail. in.	Tarsus. in.	Weight. oz.
<i>E. sunia</i> .....	♀	7·0	5·2	2·5	1·0	2
".....	♀	7·5	5·6	2·6	1·1	
<i>E. pennatus</i> .....	♀	7·0	5·6	2·4	1·1	
".....	♂	7·0	5·5	2·4	1·0	2
".....	♂	7·5	5·5	2·4	1·0	

*Remarks.*—Wings equal with tail; tarsi slightly plumed, and elbows distinctly visible.

In all these specimens the irides are of a golden yellow; bill in same light horny brown, in others a shade darker, the under mandible being dirty white tinged with yellow; feet pale leaden grey, almost colourless; claws fleshy white, the tips being light brown.

\*74 *ter.* *EPHIALTES* *GRISEUS*, Jerdon.

I have recently procured a very good series of this Scops, which appears to be as common as the two preceding ones are rare. A pair of young ones were brought to me from a hole in a yack tree, not far from my house, along with one of their parents: in the immature birds the general tone of the colour is light fulvous, *minutely* barred with brown, above as well as below, and there is no indication of the yellow collar, nor of the yellow scapulars which are so characteristic of the adult bird. The following table of measurements may prove useful:—

Sex.	Length. in.	Wing. in.	Tail. in.	Tarsus. in.	Weight.
♀ ..	8·0	6·0	3·2	1·4	} 4½ oz. to 4¾ oz. all round.
♀ ..	8·3	5·8	2·6	1·4	
♂ ..	8·5	5·6	2·7	1·5	
♀ ..	8·7	5·9	3·3	1·5	

*Remarks.*—The sexes in the *Ephialtes* group do not appear to differ in size.

Irides reddish brown; feet pale greenish yellow; pads slightly more yellow; claws light greenish white at the base, horny brown at the tips; upper mandible pale greenish brown at the base, brown at the tip; lower mandible horny white. Tarsi *well plumed*; elbows *not* visible.

\*77. *ATHENE RADIATA*, Tickell.

On the 7th February last, I heard the call-note of a pair of these little Owlets, about 4 o'clock in the morning, from a tree close to my tent. My friend Mr. Russell, who was ready equipped for a shooting-excursion, shot one of them for me; and on the following morning the female was also shot, as she alighted on the ground to pick up a small black beetle, about an inch long.

The Jungle-Owlet is far from uncommon in some parts of the country; its call is very peculiar and quite distinct from that of any other Owl that I know of. It is a perfect miniature of its hill representative *A. cuculoides*.

\*81. *NINOX SCUTELLATUS*, Raffles.

Four specimens. A pair, male and female, which I kept alive for some time, measured as follows:—♂, length  $11\frac{1}{4}$ , wing  $7\frac{1}{2}$ ; ♀, length  $11\frac{1}{2}$ , wing 8. Although the female is a trifle larger as regards linear dimensions, the male certainly looked the more robust bird of the two in life. The Hawk-Owl breeds here, as do also the three species of *Ephialtes*; but I have not as yet succeeded in procuring their eggs.

## EXPLANATION OF PLATE III.

- Fig. 1. *Aquila hastata* ♀, from a specimen after its first moult, shot at Saharunpore, 21st October, 1874. The figure is one fourth of the natural size.  
 2. *Aquila hastata*, young ♀, from a specimen obtained from the nest at Saharunpore, 28th August 1873, being the youngest of the three birds obtained on the same occasion. This figure is also reduced to one fourth of the natural size.

### 3. Ornithological Notes from Fiji, with Descriptions of supposed new Species of Birds. By E. L. LAYARD, F.Z.S., H.B.M. Consul for Fiji and Tonga.

[Received December 5, 1874.]

Two birds belonging to the genus *Ptilotis* are described in the 'Ornithologie der Viti-, Samoa- und Tonga-Inseln' of Drs. Finsch and Hartlaub. The first, *Ptilotis carunculata*, is apparently, from the number of specimens I have seen, pretty common in the Samoan Islands; the second, *P. procerior*, I can vouch, from personal observation, is common on the island of Ovalau and about Suva, on the east coast of Viti Levu. I should have said that it was equally common throughout the islands, as wherever I have been (and I have visited most of the chief islands) the loud clear whistle of a *Ptilotis* was the first sound that greeted our landing. But on the arrival of H.M.S. 'Challenger' at Levuka, I was shown the birds that had been collected during their short stay at Kandavu, the most southerly island of this group. I at once detected a new *Ptilotis* among them,

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which, at the suggestion of Professor Wyville Thomson, I now proceed to describe as

*PTILOTI PROVOCATOR*, sp. nov.

*Male.* Above greyish brown, tinged with green, especially on the rump; back, between the shoulders (interscapulium) marked with narrow, white, indistinct pencillings, caused by the shafts of the feathers being whitish, showing plainer in some specimens than in others; back of the head (sinciput) indistinctly mottled with white; forehead (frons) blackish, the colour extending and darkening in front of the eye and under it backwards to the ear, where it bifurcates; eye surrounded by a patch of bright yellow, broken immediately below the eye by a white spot, and changing into brownish yellow above the eye; eyelid yellow; chin grey; feathers of the neck (jugulum) lanceolate, grey, tinged with yellowish green; breast (pectus) the same; underparts generally pale grey, more or less mottled; vent nearly immaculate; wing and tail-feathers brown; primaries faintly edged with grey; secondaries deeply edged with yellowish green; tertiaries and coverts edged and tipped with pale greenish grey, the tips forming two bars; flexure of wing on the inside yellow-brown.

Bill black; legs verditer; iris brown. Length 7" 3"; wing 4"; tail 3" 7"; tarsus 1" 2"; bill 1" 1".

*Female.* Less brightly coloured than the male, especially about the eye; but above all she differs remarkably in size, being, length 6" 3", wing 3" 6", tail 2" 11", tarsus 11", bill 11".

The want of bare spaces about the eye and the lanceolate shape of the feathers at once distinguish this species from *P. procerior*; but in habits and call-note they are similar.

Seven specimens, two of which were females, were obtained at Kandavu. They frequented, in considerable numbers, the *Erythrina* trees that happened to be in flower; the males preponderated over the females, it being, I fancy, from the sexual development, the breeding-season. I find also that *P. procerior* is breeding here in Ovalaï, together with many other species. They clung head downwards to the bunches of the gorgeous flowers, extracting the juices and the minute insects which came there for the same purpose, and with which their stomachs were crammed. While thus employed they were silent, but when among the coconut-groves or the leafy forest they were very noisy. My impression is, that several new forms of this genus will be found in these islands. This one seems to be confined to Kandavu; but as I have met with the genus wherever I have been (I have not had time to shoot specimens), I fancy we shall find more than the two known species among the 200 and odd islands of the Fiji group.

In looking over Finsch and Hartlaub's table showing the geographical distribution of species (I regret to say the German text is a sealed book to me), I see he gives the Fiji group as a habitat of *P. carunculata* without designating the locality.

A little *Rhipidura* has turned up here in Ovalaï, which (as I cannot

identify it with *R. nebulosa*, described by Finsch and Hartlaub, and they do not give a *Rhipidura* as an inhabitant of this group) I take to be new, and therefore provisionally describe under the name

*RHIPIDURA ALBOGULARIS*, sp. nov.

*Female*. Upper parts above very dark black-brown, tinged with a warm reddish brown on the rump and back; eyebrow, chin, and throat white; underparts greyish, more or less longitudinally striped with black and white, and tinged on the belly and vent with isabella yellow. Primaries dark brown; secondaries faintly edged with reddish brown; tertiaries and coverts edged and tipped with the same. Tail-feathers dark brown, all but the four central broadly tipped with white. Bill black; base of lower mandible orange; bristles of bill black, and exceeding it in length. Legs blackish; iris brown. Length 6"; wing 3"; tail 3" 6"; tarsus 10"; bill 6".

The specimen described was shot by my butler on the 11th of August of this year, very high up in the mountains; its stomach contained minute insects; another was seen but not secured, probably the male. It was very restless and continually spreading its tail, jerking it over its back.

September 11th.—Another just shot up the mountain.

I may as well here indicate the existence of a new *Zosterops* in Kandavu. I saw several specimens in the 'Challenger' collection, but failed to find it myself in my visit there, though I obtained the common *Z. flaviceps*, from which it was distinguished by being yellow from the chin to the abdomen, and without the ash-colour collar. Unfortunately, when Professor Wyville Thomson suggested that I should describe the new species, the specimens had been packed away; a more detailed description must therefore await the advent in England of the 'Challenger's' treasures; meanwhile I suggest the specific name of *Z. explorer*, as indicating the 'Expedition,' and well illustrating the inquisitive poking-into-everything character of the birds of this genus.

Drs. Finsch and Hartlaub do not include *Tachypetes aquila* in their inhabitants of these islands; but I found them very common here during the hurricane-months (January to the end of March); during the gales they came to land, and my son shot one from the consulate door. I also saw them while cruising about among the islands.

This (September) seems about the middle of the breeding-season, though some species breed earlier, *e.g.* *Astur cruentus*, young of which I received with the down on them in May. I have eggs brought to me of *Ptilotis procerior* (hard-set), *Artamus mentalis* (also young birds able to fly), *Astur cruentus* (probably a second laying), *Zosterops flaviceps*, and *Ardea javanica*. The last-named eggs were obtained by Mr. A. Boyd, one of my kind helpers in my collecting, who also informed me that he knew of Terns and Plovers breeding in some isolated rocks; but on going for their eggs, he found they had been harried by the natives, two days previously, for a Sunday feast; the old birds were still frequenting the place, uttering doleful cries.

Another informant tells me *Sterna bergii* breeds on his rocks in November.

While at Suva lately I saw *Charadrius fulvus* in pairs, the male in full nuptial dress.

The testes of *Chrysæna luteovirens*, *Columba vitiensis*, and *Carpophaga latrans* were also much developed; but I obtained eggs of the latter two months ago. I have eggs and young of *Platycercus splendens* and *P. personatus*, the latter nearly fully fledged. By the way, Professor von Suhm, of the 'Challenger,' and I, after going carefully into the subject, have come to the conclusion that the "Orange Dove" of Savinni and Lanthala (*Chrysæna victor*, Gould) is a phase of plumage of the "Green Dove" (*C. luteovirens*); the change is hardly more remarkable than the adult change of *Ptilinopus perousei*, also from green to yellow, though a very light one.

The Fiji Islands are very destitute of birds, very few being seen or heard in the forests; and its shores are equally void of bird-life. An exception there is in the case of the little Swift, *Collocalia spodiopygia*, which seems universally distributed, both inland and in the maritime regions. *Charadrius fulvus* goes up the river a long way, and is sometimes seen in flocks of two or three hundreds, as I saw them on the Rewa. It is very strange, however, to look on the sea, as I do from my house, and not to see the white wing of a Tern for weeks at a time; of Gulls there are none. I have seen a *Puffinus* (probably *P. nugax*) in my cruising; and *Sterna fuliginosa* and *Anous stolidus* (or *A. leucocapillus*) appear in large flocks; *Gygis alba* I saw lately on the east coast of Viti Levu (this is not included in the table of distribution); and I have detected the tail-feathers of *Phaëton rubricauda* in the heads of some natives. *Anas superciliosa* is common on the rivers, and *Dendrocygna vagans* in the marshes on the west coast of Viti Levu; it is called by the planters the "Mountain Duck;" and they say it comes from the interior.

Levuka, Ovalaï, Fiji.  
September 6, 1874.

January 19, 1875.

Robert Hudson, Esq., F.R.S., V.P., in the Chair.

The Secretary called attention to a letter recently received from Ternate, in which the writer (Mr. A. A. Bruijn) stated that he possessed living examples of *Dasyptilus pesqueti*, and of four species of Paradise-birds, namely *Paradisea papuana*, *Seleucides alba*, *Diphyllodes speciosa*, and *Ptilorhis magnifica*.

The Secretary read a letter received from Dr. Adolf Bernhard Meyer, communicating some remarks on the new Bird of Paradise lately discovered in Eastern Waigiou, and described by Mr. S. C. T.

W. van Musschenbroek (Zool. Gart. 1875, p. 29) as *Diphyllodes gulielmi* III. Dr. Meyer observed:—

“Notwithstanding there are more points of resemblance between the new species and *Diphyllodes speciosa* and *D. respublica* than between it and *Cicinnurus regius*, some features immediately remind one of the latter, *e.g.* the red colour and structure of the glossy feathers of the upper parts, the webless tail-shafts, at least at the beginning, and chiefly the similar fan, formed by elongated, broad and metallic-green-edged feathers, on the sides of the breast, not quite but nearly of the same colour and size as in *Cicinnurus regius*. This fan has been hitherto known to exist only in the latter species, except as regards the homologous organization of the large *Epimachus speciosus*.

“*Diphyllodes gulielmi* III. has nearly the same-shaped crest, inserted on the neck, as *Diphyllodes speciosa*; but the crest seems to be somewhat smaller, and the colour of it differs from that of the latter species, as well as all other colours of the upper surface of the two birds, whereas the form and colour of the bill appear to be very similar in the two species. The new bird shows nothing of the broad line of iridescent feathers extending down from the chin over the breast, and nothing of the light-brown feathers of the shoulders and of the neck occurring in *Diphyllodes speciosa*.

“*Diphyllodes gulielmi* III. reminds one of *D. respublica* in the shape of the green velvet feathers of the breast, and especially in the shape of the two elongated tail-shafts, with the single difference that these are webbed in *Diphyllodes respublica* from the beginning, and that they do not project so far as in *Diphyllodes gulielmi* III.; but the breadth of the webs agrees. The colour of the web is between that of the button of *Cicinnurus regius*, which is more of a green, and that of the web of *Diphyllodes speciosa*, which is more of a blue.

“From this short comparison with the allied species, it follows that *Diphyllodes gulielmi* III. is a new species with very characteristic features, not to be confounded for a moment with any other hitherto known. These characteristic features are chiefly the shape of the elongated tail-shafts, with their web, the reddish colours of nearly all the upper parts, the violet-coloured belly, and the fan-like tufts at the sides of the breast.”

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The following papers were read:—

1. Descriptions of ten new Species of Shells from the Collection of Mr. Charles Coxen, of Brisbane, Queensland. By JOHN BRAZIER, C.M.Z.S.

[Received December 15, 1874.]

(Plate IV.)

1. *HELIX* (*HADRA*) *MOURILYANI*, sp. nov. (Plate IV. fig. 1.)  
Shell narrowly perforated, depressedly globose, thin, finely striated,

spirally banded with chestnut bands varying in width; spire raised, whorls 6 to  $6\frac{1}{2}$ , moderately convex, last descending a little in front; aperture lunate, margins rather distant; peristome reflected, purplish brown; columellar margin thickened and expanded over the perforation.

Diam. maj. 18, min. 14, alt. 12 lines.

*Hab.* Bowen, Port Denison, Queensland.

2. *HELIX (HADRA) JOHNSTONEI*, sp. nov. (Plate IV. fig. 2.)

Shell deeply perforated, globosely turbinated, rather thick, finely striated, banded with spiral chestnut bands, one very broad at the suture; whorls  $6\frac{1}{2}$ , moderately convex, last whorl large and descending in front; aperture ovately lunate, diagonal; peristome white, moderately reflected, margins approximating, columellar thickened and expanded over the perforation.

Diam. maj. 20, min. 16, alt. 14 lines.

*Hab.* Bowen, Port Denison, Queensland.

This species somewhat resembles *Helix incei* in its markings, but is more conical, and has a thick, white and reflected peristome.

3. *HELIX (HADRA) HILLI*, sp. nov. (Plate IV. fig. 3.)

Shell umbilicated, turbinate-globose, thick, dark chestnut, spirally lined with darker lines; whorls  $6\frac{1}{2}$ , convex, the three forming the apex of a light yellow, with a dark broad band below the suture, base convex, lined as above; aperture oblique; peristome thickened and reflected, white; margins approximating, the right slightly descending, columellar thickened and partly expanded over the umbilicus.

Diam. maj. 17, min.  $14\frac{1}{4}$ , alt. 12 lines.

*Hab.* Mount Elliot, Queensland.

4. *HELIX (HADRA) BELLENDEN-KERENSIS*, sp. nov. (Plate IV. fig. 4.)

Shell deeply umbilicated, globosely turbinated, obliquely striated, and minutely transversely lined with small lines resembling grains, reddish brown, with two spiral chestnut bands, one on the centre and the other above; whorls 6, slightly convex, last large; base convex, striated as above; spire conical, obtuse; aperture oblique, ovately lunate, interior blue-black; peristome thickened and reflected; margins approximating, right descending a little, columellar broadly expanded and bent inwards, forming a long callous tooth.

Diam. maj. 22, min. 17, alt. 17 lines.

*Hab.* Bellenden-Ker Mountains, North-east Australia (*Coll. Brazier*).

This fine shell was only recently obtained at the locality given, which is near to the Endeavour river. The three specimens I have seen are all of the same colour.

5. *HELIX (HADRA) COXENÆ*, sp. nov. (Plate IV. fig. 5.)

Shell umbilicated, somewhat turbinate-globose, obliquely striated,

minutely granulated, shining, thin, dirty yellow; whorls 6, convex, suture impressed, the last whorl large, obtusely carinated at the periphery, base roundly convex, with the striae running into the deep funnel-shaped umbilicus; aperture oblique, ovately lunate, interior white; peristome white, thickened, margins approximating and joined by a thin white callus, the right thin and descending below the centre, columellar reflected slightly over the umbilicus.

Diam. maj.  $14\frac{1}{2}$ , min. 13, alt. 10 lines.

*Hab.* Johnson river, Queensland; in the scrubs (*coll. Brazier*).

I feel great pleasure in naming this shell after Mrs. Charles Coxen, a lady much interested in Australian natural history.

6. *HELIX* (*HADRA*) *MOSSMANI*, sp. nov. (Plate IV. fig. 6.)

Shell imperforate, globosely turbinated, very faintly obliquely striated, exhibiting minute spiral lines and granulations (only seen under the lens), reddish yellow, with numerous spiral chestnut lines and bands; spire conical, apex obtuse; whorls  $6\frac{1}{2}$ , slightly convex, suture slightly crenulated; aperture oblique, ovately lunate; peristome black, reflected, margins approximating, the right descending at the upper part, columellar thickened, with a black callus round the umbilical region.

Diam. maj. 19, min. 15, alt.  $19\frac{1}{2}$  lines.

*Hab.* Dawson river, Queensland.

This fine species comes near to *Helix fraseri* in its markings, but differs in being more turbinated, and in the lip being thinner.

7. *HELIX* (*RHYTIDA*) *SHERIDANI*, sp. nov. (Plate IV. figs. 7, 7a.)

Shell umbilicated, conoidly globose, thin, closely, regularly and finely obliquely striated to the periphery, reddish chestnut; whorls  $4\frac{1}{2}$ , moderately convex, the last large, flattened at the suture, base convex, showing faint, irregular, oblique lines from the periphery to the edge of the umbilicus, where they become more conspicuous; umbilicus wide and deep; aperture nearly vertical, roundly lunate, bluish within; peristome acute, margins distant, columellar a little dilated.

Diam. maj.  $13\frac{1}{2}$ , min. 11, alt. 8 lines.

*Hab.* Cardwell, Rockingham Bay, N.E. Australia.

I have named this species at the request of Mr. Coxen after his friend Mr. Sheridan, of Cardwell.

8. *HELIX* (*XANTHOMELON*) *DAINTREEI*. (Plate IV. fig. 8.)

Shell umbilicated, somewhat depressedly globose, very thin, rugosely striated, minutely granulated, pale yellowish brown; spire conical, obtuse; whorls  $5\frac{1}{2}$ , convex, last large, inflated, base convex, nearly smooth; aperture oblique, lunate; peristome thickened, white, margins approximating, right descending in front, columellar reflected and partly covering the umbilicus.

Diam. maj. 12, min.  $9\frac{1}{2}$ , alt.  $9\frac{1}{2}$  lines.

*Hab.* Muggersbaa, Moreton Bay, Queensland.

9. *PUPINA COXENI*, sp. nov. (Plate IV. fig. 9.)

Shell elongately ovate, rather thin, polished, shining, translucent, quite smooth, pale reddish horn-colour; spire conical, rather acute, suture distinct; whorls 6, convex, the body-whorl the largest; aperture vertical, circular, continuous; peristome and auricles whitish, very much thickened with callus; the right canal long and narrow, covered with a large, thickened, triangular tongue on the body-whorl; columellar canal long and narrow, and covered with a somewhat similar tongue; peristome thickened, with a broad flattened plate below, widening towards the columella.

Length, from apex to lip  $4\frac{1}{2}$  lines, from apex to broad margin below lip 5 lines; breadth  $2\frac{1}{2}$  lines; diameter of aperture  $1\frac{1}{4}$  line.

*Hab.* Mount Dryander, Port Denison, N.E. Australia.

Of this charming species I have only seen one specimen, and it remains unique, in the collection of Mr. C. Coxen. I take great pleasure in attaching his name to it.

It differs from all the other known Australian species of the genus *Pupina* of the polished class in having two lips, one raised perpendicularly for nearly half a line all round, the other forming a margin below.

10. *CONUS COXENI*, sp. nov. (Plate IV. fig. 10.)

Shell fusiform, thick, smooth, with twenty deep, spiral, punctated lines on the lower part; above, the shell becomes nearly smooth; at the angle there are three deep punctated lines which run spirally to the apex; whorls 8, flattened posteriorly, with deeply punctated lines next the suture, dotted with brown at the angle; spire elevated, apex acute; columellar margin nearly straight, curved a little at the lower part; lip simple, thin, crenated, bluish brown within, the outer surface marked with brown flames and white and brown transverse dots.

Length 15, breadth 7 lines.

*Hab.* Moreton Bay.

## EXPLANATION OF PLATE IV.

- Fig. 1. *Helix (Hadra) mourilyani*, p. 31.  
 2. — (—) *johnstonei*, p. 32.  
 3. — (—) *hilli*, p. 32.  
 4. — (—) *bellenden-kerensis*, p. 32.  
 5. — (—) *coxense*, p. 32.  
 6. — (—) *massmani*, p. 33.  
 7, 7a. — (*Rhytida*) *sheridani*, p. 33.  
 8. — (*Xanthomelon*) *daintreei*, p. 33.  
 9. *Pupina coxeni*, p. 34.  
 10. *Conus coxeni*, p. 34.



2. Descriptions of four new Species of *Protopogonius*.

By A. G. BUTLER, F.L.S., F.Z.S., &amp;c.

[Received December 18, 1874.]

(Plate V.)

Mr. Druce having kindly allowed me to determine the forms of *Protopogonius*\* in his collection, I find them to represent the following species:—

1. *Protopogonius cecrops*, Westwood. 2 examples.
2. ——— *lilops*, Butler. 2 examples.
3. ——— *tithoreides*, Butler. 2 examples.
4. ——— *æquatorialis*, n. sp. 1 example.
5. ——— *fulvus*, n. sp. 1 example.
6. ——— *hippona*, Fabricius. 1 example.
7. ——— *diffusus*, n. sp. 1 example.
8. ——— *semifulvus*, n. sp. 1 example.

Of the last mentioned species I have seen several specimens, taken by Mr. Buckley.

## 1. PROTOGONIUS ÆQUATORIALIS, n. sp. (Plate V. fig. 1.)

Allied to *P. lilops*. Primaries black, a broad fulvous streak running from base, through the cell, across base of second median interspace, thence (bounded by second median branch) to second third of first median interspace, and thence obliquely to external angle; inner margin rather broadly black; basal half of costa tawny; a subcostal dot at end of cell, an elliptical spot on upper discoidal interspace, an elongate-lunate spot below it on the lower discoidal interspace, and five large submarginal spots in a semicircle from subcostal nervure to second median branch (the third and fourth spots smaller than the others), all ochreous; secondaries only differing from those of *P. lilops* in the shorter black border, terminating just above radial nervure, and the larger white spots upon it; wings below much as usual, primaries with a double sub-apical ochreous patch, central band of secondaries unusually angular, a well-marked submarginal whitish streak towards anal angle. Expanse of wings 3 inches 8 lines.

Curaray, Ecuador.

Coll. Druce.

Perhaps a mimic of *Melinæa imitata*, but I rather doubt that species ranging into Ecuador; we have it in the British Museum from Guatemala, Mexico, and Honduras only.

## 2. PROTOGONIUS FULVUS, n. sp. (Plate V. fig. 2.)

Allied to *P. castaneus*. Basal two thirds of primaries tawny; apical third black; a broad black streak running from base of costa through discocellulars to apical area, and a broad internal streak running to outer margin at external angle; a broad oblique tawny ochreous band, zigzag internally, irregularly bisinuate externally,

\* See "Revision of the genus *Protopogonius*," P. Z. S. 1873, p. 772.

running from second third of costa to near the end of second median interspace; four apical submarginal ochreous spots, the two upper ones largest, the first sagittate; secondaries with the costal half tawny, the costa, subcostal vein, and anal half black; an apical submarginal blackish line; four submarginal tawny-tinted white spots: body brown; antennæ with the apical three-fifths yellow, base black: wings below very like *P. tithoreides*; primaries paler, two or three pale stramineous subapical spots; secondaries darker, the costal half of wing suffused with castaneous. Expanse of wings 3 inches 4 lines.

Pebas.

Coll. Druce.

Apparently a mimic of *Tithorea megara*.

### 3. PROTOGONIUS DIFFUSUS, n. sp. (Plate V. fig. 3.)

Wings above tawny; primaries with the apex from costa just beyond end of cell to third median branch dark brown, outer margin from third to first median branch narrowly bordered with brown; a rather broad band from basal costa to end of cell, uniting with an irregular oblique band from end of cell, crossing second median interspace near the base; a broad black internal streak, nearly reaching external angle; a broad subapical ochreous band, diffused and fading away into the ground-colour below second median branch; secondaries with the costa narrowly black; outer margin broadly bordered with black, tapering from inner margin to second subcostal branch; three small pale ochreous submarginal spots: body olivaceous, clothed with tawny hairs; antennæ with apical two thirds ochreous, base black; wings below much as in *P. æquatorialis*, but secondaries with the bands dark brown on costal area, and anal area plumbeous. Expanse of wings 3 inches 6 lines.

Curaray, Ecuador.

Coll. Druce.

This species probably mimics *Melinæa zaneka* or *Mechanitis fallax*.

### 4. PROTOGONIUS SEMIFULVUS, n. sp. (Plate V. fig. 4.)

Primaries above bright tawny; a broad patch at apex, the costa, a streak covering costal area to end of cell and terminating in a large discocellular spot, and a broad internal streak black; secondaries black; a broad patch at apex bright tawny, the base of cell and costal area dull tawny; abdominal area brown: body brown; antennæ pale yellow, basal joint black; under surface almost as in *P. tithoreides*, but without subapical white spot.

Villagomes, Ecuador.

Coll. Druce.

Mimics *Melinæa methone* and parallels *Mechanitis decepta*, *Ceratinia semifulva*, *Heliconius bicoloratus*, *Eresia ithomiola*, and *Pericopis hydra*, all of which are coloured in the same way and range over the same region.

#### EXPLANATION OF PLATE V.

Fig. 1. *Protophonus æquatorialis*, p. 35.

2. — *fulvus*, p. 35.

3. — *diffusus*, p. 36.

4. — *semifulvus*, p. 36.

3. Descriptions of some new Species of South-American Birds. By P. L. SCLATER, M.A., Ph.D., F.R.S., and OSBERT SALVIN, M.A., F.R.S.

[Received December 21, 1874.]

(Plate VI.)

1. MICROCERCULUS SQUAMULATUS, sp. nov. (Plate VI.)

*Supra fuscus unicolor: subtus fere concolor, gutture albo, pectore et ventre medio albis, plumis fusco undulatis: subalaribus et remigum marginibus internis fuscescenti-cineraceis: rostro corneo; pedibus fuscis: long. tota 4.2, alæ 2.5, caudæ 0.8, rostri a rictu 1.*

*Hab.* Venezuela, San Cristobal (Goering).

*Obs.* Aff. *M. bamblæ*, sed fascia alari alba nulla, et gutture albo necnon ventre squamulato diversus.

A single skin of this apparently new *Microcerculus* occurs in Goering's last collection. It was obtained at San Cristobal in the Venezuelan province of Tachira, on the frontiers of Columbia. In form it seems to be nearest to *M. bamblæ*, but in plumage is perhaps rather more likely to be confounded with *M. marginatus*, than which, however, it has much less white below and has a longer bill.

The discovery of this bird increases the number of known species of the genus *Microcerculus* to six\*. *M. squamulatus* should stand next to *M. bamblæ*.

2. AUTOMOLUS STRIATICEPS, sp. nov.

*Terreno-brunneus, pileo nigricante; hoc cum dorso superiore flavido longitudinaliter lineato; alis immaculatis: uropygii et cauda tota rubiginoso-rufis: subtus fulvus, lateraliter obscurior, gutturis plumis fusco marginatis quasi squamulatis: subalaribus et remigum marginibus internis flavicanti-fulvis: rostro corneo, pedibus fuscis: long. tota 7, alæ 3.5, caudæ rectr. med. 3.5, ext. 2.25.*

*Hab.* Columbia int. et Peruv.

A Bogota skin of this species has been in Sclater's collection for some time, having been purchased from a London dealer. Its bill is not quite perfect; and the general similarity of its plumage to that of *Anabazenops subalaris* caused it to be passed over when our 'Nomenclator' was written. When M. Taczanowski brought M. Jelski's Peruvian collections to compare with Sclater's series a second, perfect example of this bird was found, which had been obtained by Jelski at Chilpes in Central Peru; and M. Taczanowski has inserted it in his list under Sclater's MS. name †.

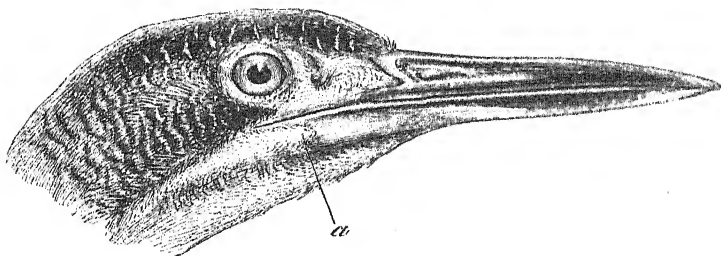
*A. striaticeps* is, in fact, a very distinct species, belonging to the more strongly formed *Automoli* allied to *A. cervinigularis*, *A. ochrolæmus*, &c., and is distinguishable from all species known to us by

\* For a list of the other species, see Scl. et Salv. Nomencl. Av. Am. p. 6.

† P. Z. S. 1874, p. 528.

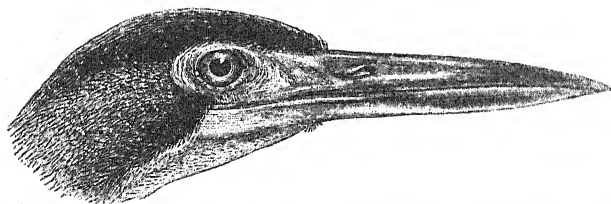
its clearly striated head and neck. M. Taczanowski thought that it might be the *Anabates melanorhynchus* of Tschudi (F. P. *Aves*, p. 211, pl. xxi. fig. 1); but we believe that that name is a mere synonym of *A. subulatus*, Spix.

Fig. 1.



Head of *Tigrisoma fusciatum*, half natural size.  
a. Feather-patch on base of lower mandible.

Fig. 2.



Head of *Tigrisoma salmoni* (half natural size), showing bare space on lower mandible.

### 3. *TIGRISOMA SALMONI*, sp. n.

Mas ad. *Supra viridescenti-aneo-nigricans, pallido cervino (nisi in pileo) crebre transfusciatum: alis caudaque schistaceo-nigris, illis et alula spuria albo terminatis; campterio et margine alari albis: mandibula, sicut in T. brasiliensi nuda; gula media alba, plumosa, lateraliter nuda albo circumcincta: cervice media alba rufescente intermixto: abdomine rufescente: hypochondriis fusco-nigris; subalaribus albo nigroque variolatis: rostro fusco-nigro, mandibula margine inferiore flavido: long. tot. 26 poll., alæ 10·50, caudæ 4, rostri a rictu 4·5.*

Avis hornot. *Supra nigra cinnamomeo punctata, dorsi maculis minoribus: uropygio fusco-nigro albo transfasciato: alis et cauda schistaceo-nigris, hac fuscis tribus angustis notata, illis albo terminatis; secundariis albo transfasciatis: gula parte vestita alba: pectore et abdomine albis, maculis fuscis cervino marginatis punctatis; hypochondriis albo nigroque transfasciatis: campterio et margine alari albis: long. tarsi 3·5, dig. med. cum ungue 3·1.*

*Hab.* Columbia ad ripas fluv. Cauca (*T. K. Salmon*).

*Obs.* Sp. *T. fasciato* quoad coloribus proxima, sed mandibulæ basi nuda, fasciis corporis supra crebrioribus et pileo immaculato distinguenda.

This species of Tiger Bittern, of which Mr. T. K. Salmon has sent two specimens from Medellin, one in adult (the tarsi of which are wanting) and the other in immature dress, is certainly quite distinct from *T. brasiliense*, the well-known species found in Guiana, the valley of the Amazon, and on the Isthmus of Panama. From *T. brasiliense* it differs at first sight in the head being black instead of rufous and in having the sides of the neck blackish, banded by numerous whitish bars, whereas in *T. brasiliense* the neck is rufous, mottled with black spots. It agrees, however, with *T. brasiliense* in the absence of the patch of feathers which in *T. fasciatum* (fig. 1, p. 38) run forward along the middle of the rami of the mandible (see fig. 2, p. 38).

On reexamining the specimen in the British Museum referred by us in 'Exotic Ornithology' to *T. fasciatum* (Ex. Orn. p. 183) we find that we were in error in our determination. The patch of feathers already mentioned as existing at the base of the mandible in the true *T. fasciatum* being absent in this specimen, it should, we believe, be referred to the bird which we are now describing. Nothing is known concerning the origin of this specimen.

A short synopsis of the three species of *Tigrisoma* hitherto known to inhabit South America will be found in 'Exotic Ornithology' (p. 185). This synopsis expanded to include the present bird may stand as follows:—

A. Species gula media plumosa lateraliter nuda.

a'. Mandibula ad basin nuda.

a". Pileo colloque supero castaneis ..... *T. brasiliense*.

b". Pileo colloque nigris, hoc albido transfasciato ..... *T. salmomi*.

b'. Mandibula ad basin plumosa ..... *T. fasciatum*.

B. Species gula omnino nuda. .... *T. cabanisi*.

#### 4. Additional Evidence as to the original Fauna of Rodriguez.

By ALFRED NEWTON, M.A., F.R.S., F.Z.S., &c.

[Received January 15, 1875.]

M. Rouillard, a magistrate of Mauritius, having occasion last summer to make some researches among the Archives of the Ministère de la Marine at Paris, accidentally came upon a manuscript 'Relation de l'Île Rodriguez,'\* which fact he, with great kindness, immediately reported to my brother, Mr. Edward Newton, offering, if the latter wished, to obtain a copy of it for him. My brother gladly availed himself of the opportunity, and requested M. Rouillard to place the transcript in my hands. I now have the pleasure of exhibiting it. It gives in many respects a very precise description of the island and its productions; but on this occasion I will content myself with extracting from it what is said

\* "Isle de France, Correspondance g<sup>le</sup>. Volume 12 (Archives de la Marine), 1760."

“DES OISEAUX DE TERRE.

“LE SOLITAIRE est un gros oiseau qui pèse environ 40 à 50 livres. Ils ont la tête fort grosse\* avec une manière de bandeau au front qu'on dirait être de velours noir. Leurs plumes ne sont ni plumes ni poils ; ils sont d'un gris blanc, le dessus du dos un peu noir, marchant avec fierté, et fort souvent seuls à seuls ou deux à deux ; ils ajustent leurs plumes ou poils avec leur bec et se tiennent d'un grand propre. Ils ont leurs pattes remplies d'écaille fort dure et courent avec vitesse, principalement dans les roches, où un homme, quelque agile qu'il puisse être a beaucoup de peine à les attraper. Ils ont un bec fort court, de la largeur de près d'un pouce, qui est coupant ; ils ne cherchent cependant point à faire de mal que lorsqu'il se trouverait quelqu'un devant eux et qu'ils seraient pressés, ils pourraient le mordre ; ils ont un petit sicot d'ailes qui a comme une manière de balle de fusil au bout, et cela leur sert de défense. Ils ne volent point, n'ayant point de plumes à leurs ailes, mais se battent avec et font un grand bruit avec leurs ailes lorsqu'ils sont en colère, et le bruit approche fort de celui du tonnerre qu'on a un peu de peine à entendre. Ils ne pondent, à ce que je crois, qu'une fois l'année, et ne font même qu'un œuf ; non pas que j'aie vu de leurs œufs, car je n'ai pu découvrir où ils pondent ; mais seulement ai-je vu un seul petit avec eux ; et lorsque quelqu'un voudrait se hasarder d'en approcher ils le mordraient bien dur. Ces oiseaux vivent de graines et de feuilles d'arbres qu'ils ramassent par terre ; ils ont le gésier plus gros que le poing, et ce qu'il y a de surprenant c'est qu'on leur trouve une pierre dedans de la grosseur d'un œuf de poule, faite en ovale, un peu plate quoique cet animal ne puisse avaler si gros qu'une petite cerise. J'en ai mangé ; ils sont d'assez bon goût.”

The preceding of course relates to *Pezophaps solitaria*, and contains several points of interest, on which I will only now remark that between the time of Leguat and that of the writer the ill-fated bird seems to have learnt to resent injurious treatment by biting, and that the black, velvet-like frontal band is a feature not mentioned by the older author, with whose work, I should mention, the later writer shows himself, in several places, to have been acquainted. The next passage is perhaps more important.

“Il y a une sorte d'oiseau de la grosseur d'une jeune poule qui a la patte et le bec rouges. Son bec est à peu près comme celui du Courliou, à l'exception qu'il est un peu plus gros et qu'il n'est pas tout-à-fait si long. Son plumage est moucheté de blanc et de gris ; ils vivent ordinairement des œufs des tortues de terre qu'ils prennent dans la terre ; ce qui fait qu'ils sont si gras que souvent ils ont peine à courir. Ils sont fort bons à manger et leur graisse est d'un jaune rouge qui est excellente pour les douleurs. Ils ont de petits bouts d'aïlerons sans plumes, ce qui fait qu'ils ne peuvent pas voler, et au contraire courent assez bien. Leur cri est un sifflement continu, lorsqu'ils voient quelqu'un qui les poursuit, et tirent de leurs corps

\* In this and other obvious cases of misspelling I merely follow the copy before me ; and, for reasons to be finally given, there is no need to dwell upon them further.

une autre sorte de voix qu'on dirait provenir d'une personne qui a le hoquet et l'estomac oppressé."

From the similarity of coloration we may, I think, without much risk of error, identify the bird of which these particulars are given with the "*Gelinotte*" of Leguat, named by M. Alphonse Milne-Edwards *Erythromachus leguati*\*, and, from remains obtained by Mr. Edward Newton, proved to belong to the *Rallida*—a determination which possibly may explain its unexpected egg-eating propensities.

We then have a gleam of light on another extinct species:—

"Il y a assez de Butoirs, qui sont des oiseaux qui ne volent que fort peu et courent parfaitement bien lorsqu'ils sont poursuivis. Ils sont de la grosseur d'une aigrette et faits comme elles."

These Bitterns are no doubt the *Ardea megacephala* of M. Milne-Edwards†; and the passage is a remarkable corroboration of that naturalist's opinion that the species was brevipennate, though it had not entirely lost the power of flight.

The paragraph continues:—

"— On trouve un petit oiseau qui n'est pas fort commun, car il ne se trouve pas sur la grande terre; on en voit sur l'île au Mât, qui est au sud de la grande terre, et je crois qu'il se tient sur cette île à cause des oiseaux de proie qui sont à la grande terre, comme aussi pour vivre avec plus de facilité des œufs de ces oiseaux de pêche qui y pondent, car ils ne mangent autre chose que les œufs ou quelques tortues mortes de faim qu'ils savent assez bien déchirer. Ces oiseaux sont un peu plus gros qu'un merle et ont le plumage blanc, une partie des ailes et de la queue noire, le bec jaune aussi bien que les pattes, et ont un ramage merveilleux; je dis un ramage quoiqu'ils en aient plusieurs, et tous différents, et chacun des plus jolis. Nous en avons nourri quelques uns avec de la viande cuite hachée bien menu, qu'ils mangeaient préférablement aux graines de bois."

I am at a loss to conjecture what these birds were, unless possibly of some form allied to *Fregilupus*. With more certainty the next mentioned can be identified.

"Les Perroquets sont de trois sortes, et en quantité. Les plus gros sont plus gros qu'un pigeon et ont une queue fort longue, la tête grosse, aussi bien que le bec. La plupart vont sur les îles qui sont au Sud de l'île, où ils mangent d'une petite graine noire que produit un petit arbrisseau dont les feuilles ont l'odeur du citronnier, et viennent à la grande terre boire de l'eau. D'autres restent à la grande terre où ils trouvent de ces petits arbrisseaux. La seconde espèce est un peu plus petite et beaucoup plus belle, parcequ'ils ont leur plumage vert comme les précédents, un peu plus bleu et le dessus des ailes un peu rouge, aussi bien que leur bec.

"La troisième espèce est petite et est toute verte, et le bec noir."

Of these three species of Parrot, the first can without danger be referred to the *Necropsittacus rodericanus*, some years since deter-

\* Annales des Sciences Naturelles, Zoologie, ser. 5, xix. Art. 3, p. 6, pl. 11. figs. 1-1 a, pl. 12. figs. 3-4 a.

† *Op. cit.* p. 10, pl. 14. figs. 1-14.

mined by M. Milne-Edwards from bones sent him by my brother\*, and doubtless quite extinct; the second is unquestionably *Palæornis exsul*, described by myself†, which has lingered into our own times; and the third is the species of *Agapornis* known still to exist in Rodriguez, and thought by my brother to be *A. cana*‡; but since neither he (so far as I am at this moment aware) nor I have ever examined a specimen, the matter must remain an open question at present. It is interesting, however, to have the particulars above given as to the colouring of *N. rodericanus* and *P. exsul*.

Continuing my extracts, the next is

“LES TOURTERELLES y sont en grand nombre, mais sur la grande terre on en voit fort peu, parcequ’elles vont vivre sur les îles du Sud, aussi bien que les perroquets, et viennent boire de même sur la grande terre.”

This adds nothing of importance to our knowledge of the *Columbidæ* of Rodriguez.

We then have a notice of a bird also mentioned by Leguat:—

“On voit un oiseau qui est à peu près comme la chouette, et qui mange les petits oiseau et les petits lézards. Ils demeurent presque toujours dans les arbres et lorsqu’ils sentent le beau temps, ils chantent la nuit et toujours le même chant; au contraire, lorsqu’ils sentent du mauvais temps on ne les entend point.”

This is evidently the *Athene murivora* of M. Milne-Edwards§.

The concluding notices of birds are:—

“Il y a beaucoup de CHARDONNETS qui ont un joli ramage.

“On voit quelques LAVANDIÈRES, avec quelques autres petits oiseaux qui ont un fort joli ramage, mais ils sont toujours en garde des oiseaux de proie, qui sont les chouettes, dont j’ai parlé ci-devant.”

The “*Chardonnerets*” may well be referred to *Houdia rodericana*, discovered by my brother||; and among the other little birds was probably included *Dryocæca* (?) *flavicans*¶; but no trace of the “*Lavandières*” remains, so far as I know.

I have only to add that so soon as I obtained the copy of this document I acquainted M. Alphonse Milne-Edwards with the fact, requesting him to examine the original and let me know his opinion of it. This he, with his usual kindness, has done; and within the last few days he has written me word that the Report is evidently the work of an unlettered sailor (as, indeed, I myself had already concluded), but that he has failed to discover the name of its author. Though now bound up with other documents of the year 1760, he considers that it must have been written some years earlier, and most likely in 1729 or 1730. I need not here dwell upon the reasons which have led him to form this opinion, because he intends

\* Annales des Sciences Naturelles, Zoologie, ser. 5, viii. pp. 145–156, pls. 7, 8, xix. Art. 3, p. 18, pl. 13. figs. 2–2e; Comptes Rendus, lxx. pp. 1121–1125.

† Ibid, 1872, p. 33.

‡ Ibid, 1865, p. 149.

§ Annales des Sciences Naturelles, Zoologie, ser. 5, xix. Art. 3, p. 13, pl. 11. figs. 2–2e.

|| P. Z. S. 1865, p. 47, pl. i. figs. 1, 2.

¶ Tom. cit. p. 47, pl. i. fig. 3.



shortly to make them public. They are no doubt valid; and I shall conclude by observing that this 'Relation' accordingly offers no evidence of the later existence of the Solitaire and other extinct birds of Rodriguez than we already had from the journal of Pingré kept in 1761.

5. Supplementary Notes on the Species of *Helicidæ* of the Subgenus *Plectopylis*. By Major H. H. GODWIN-AUSTEN, F.R.G.S., F.Z.S., &c., Deputy Superintendent, Topographical Survey of India.

[Received January 11, 1875.]

Since I have been at Calcutta, I have looked over the specimens of *Plectopylis* in the Museum, and find some additional notes to add to my former paper, as well as a new species, which I now proceed to describe.

HELIX (PLECTOPYLIS) TRILAMELLARIS, n. sp.

Shell sinistral, widely and openly umbilicated, discoid, flat above; apex slightly raised, solid, covered with a brown epidermis, roughly and obliquely striated. Whorls 7, sides well rounded. Aperture oblique, widely lunate. Peristome white, much reflected and thickened, the margins united by a strong high ridge, reflected slightly forward, a slight notch separating it from the lower margin of the peristome. A single simple parietal vertical lamina is situated nearly one half of the circumference from the aperture, giving off from its lower end a long horizontal lamella, which extends halfway to the aperture; the usual median horizontal lamella is not united to the vertical lamina, but extends up to, and is united to the apertural parietal ridge, and is strongly developed. A third, thread-like free lamella extends also up to the aperture, having its origin just below the vertical lamina. The palatal plicæ are simple, six in number, the first and upper very short, the second very long, and the rest moderate and equal.

	inch.
Major diam.....	0·65
Minor diam.....	0·55
Alt. axis .....	0·22

*Hab.* Burmah. Exact locality unknown; collected by Mr. Theobald, jun., of the Geological Survey of India. In the collection of the Indian Museum, Calcutta.

On an examination, kindly assisted by Mr. G. Nevill, of the Indian Museum, Calcutta, of all the species of this genus, the above form turned up. It differs so much from *P. perarcta*, with which it is closely allied, that I do not hesitate to describe it as new. From that shell it differs internally in the upper horizontal lamella being

continuous to the aperture, and in the second being much longer, as well as in the lengthened form of the second palatal plica; outwardly in the raised high form of the apertural parietal ridge. There are two specimens from the same locality in the Museum; and in both the characters are identical.

Besides describing this new species, I have the following remarks to make on the species mentioned in my previous communication.

The species known as *P. refuga*, Gould, var. *dextrorsa*, from Philé Thaw, is very close to *P. pseudophis*. It is a sinistral form, with these differences—that the vertical parietal plica is rounded, not notched as in *P. pseudophis*, and the long free horizontal lamella beneath it is absent altogether.

This form should now stand as a distinct species, under the title *Plectopylis dextrorsa*.

Again, *Helix (Plectopylis) refuga*, Gould (figured by Philippi, Abbild. und Beschr. Conch. pl. x. fig. 4), is the same shell as *P. leiophis*, Bs., the former name having the priority by eleven years; but in the original description the internal arrangement of the epiphragms is not noticed.

Calcutta, Nov. 13, 1874.

February 2, 1875.

Dr. A. Günther, F.R.S., V.P., in the Chair.

Mr. Sclater exhibited a fine skin and skull of a female Huemul (*Cervus chilensis*), and a pair of horns of an adult male forwarded by Mr. Edwyn C. Reed, C.M.Z.S., of the National Museum, Santiago, Chili, and read the following communication from him on the subject:—

“The Huemul is found near Sandy Point, Straits of Magellan, where our collector obtained a skin some ten years ago.

“The Chilean men-of-war, exploring the Chonos archipelago, have killed one or two each year for the last three or four years on the mainland, near the river Aysen, which may be in latitude 45° S. The skin now sent was obtained there.

“An old specimen (♂) in the Museum collection is said to have been killed in the Andes in the latitude of Concepcion, say 37° S.

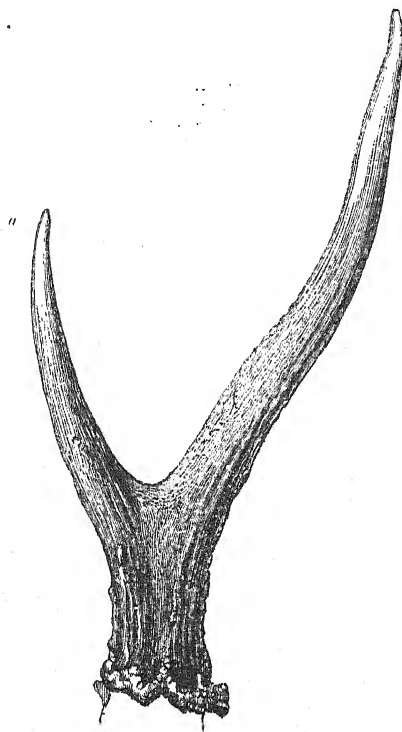
“I have recently seen a pair of horns of a specimen killed a few years ago near the baths of Canquenes, 34° 30' S. Some animals (mules or mares or both) had been a long time in a mountain pasturage; and when driven in, the Huemul came with them to the ‘corral,’ where it was lassoed and killed. The owner heard of it in time to get the horns.

“Thus we may conclude that the Huemul is found in the Andes on either side from Magellan to near Santiago, but far more rarely in the north than in the southern portion of its range.”

Mr. Sclater then made the following observations on this animal

and other species of *Cervus* found on the western slope of the Andes in Peru and Chili:—

“Mr. Reed having requested information as to the correct generic and specific names of this Deer, I answer that, according to my views,



Left horn of *Cervus chilensis* (side view). a. Brow-antler.

already expressed in a short note in the ‘Annals’ for 1873, it is simply *Cervus chilensis*.

“The following appear to be its more recent synonyms:—

“*CERVUS CHILENSIS*.

“*Cervus chilensis*, Gay et Gerv. Ann. d. Sc. Nat. v. p. 91 (1846); Gay, Hist. de Chile, Zool. i. p. 159, pl. ii.; Philippi, Wiegman. Arch. 1870, pt. i. p. 46; Selater, Ann. N. H. xi. p. 213 (1873).

“*Capreolus leucotis*, Gray, P. Z. S. 1849, p. 64, Mamm. pl. xii.

“*Huamela leucotis*, Gray, Ann. N. H. x. p. 445 (1872), et *ej.* xi. p. 219 (cum tab.) et p. 309; Gray, Hand-l. of Edent. &c. p. 160.

“As regards *Capreolus leucotis*, the female specimen originally exhibited by Dr. Gray before this Society and figured in our ‘Pro-

ceedings' would appear, from what is stated (P. Z. S. 1849, p. 64), to have been the stuffed specimen now in the Derby Museum at Liverpool\*.

"But subsequently (Cat. Ruminants, p. 89) Dr. Gray speaks of the type of *Capreolus leucotis* as being in the British Museum. The skin thus referred to belongs undoubtedly to *Cervus chilensis*, and is registered in the British Museum as from 'Valparaiso. Presented by the Earl of Derby.' But in the 'Hand-list' (l. s. c.) it is stated to be from "Patagonia."

"In his recent writings Dr. Gray has confused the synonyms of *Cervus chilensis* with those of *Cervus antisiensis* of D'Orbigny, as will be seen by the following list of the terms he has lately applied to the latter.

#### "CERVUS ANTISIENSIS.

"*Cervus antisiensis*, D'Orb. Nouv. Ann. Mus. iii. p. 91 (1834); ej. Voy. Mamm. p. 28, pl. xx. fig. 1.

"*Cervus antisiensis*, Tsch. F. P. Mamm. p. 241, tab. xviii.; Sci. Ann. N. H. xi. p. 213 (1873).

"*Anomalocera huamel*, Gray, Scient. Opin. 1869, p. 385.

"*Xenelaphus huamel*, P. Z. S. 1869, p. 497.

"*Xenelaphus leucotis*, Gray, Cat. of Rum. p. 89 (1872).

"*Xenelaphus anomalocera*, Gray, Ann. N. H. x. p. 445 (1872), et xi. pp. 220, 309.

"*Xenelaphus chilensis*, Gray, *ibid.* xii. p. 161 (1873); Gray, Hand-l. of Edent. &c. p. 159 (1873).

"*Furcifer chilensis*, Gray, Ann. N. H. xiii. p. 332 (1874).

"Mr. Whitely has sent home from Tinta and the neighbouring Andes of Peru, which he has lately explored, several examples of this species, amongst which was the monstrous-horned male upon which Dr. Gray established his genus *Anomalocera* sive *Xenelaphus*.

"Mr. Whitely writes to me that this Deer is called '*Oierco*' (not *Oieidos*, as miswritten by Dr. Gray, Ann. N. H. 1874), and is found in large troops at a higher elevation than *C. peruvianus*.

"Besides this, Mr. Whitely has likewise obtained in Western Peru heads of two other species of Deer, upon which Dr. Gray has established his *Cervus whitelyi* and *C. peruvianus*.

"The synonyms of these species stand as follows:—

#### "CERVUS WHITELYI.

"*Cervus whitelyi*, Gray, Ann. N. H. xii. p. 163 (1873).

"*Coassus whitelyi*, Gray, Hand-l. of Edent. &c. p. 162, t. xxxii. fig. 2.

"This species is based upon a single skull of a female obtained near Cosnipata in the Peruvian Andes. As Dr. Gray remarks, it appears to belong to the section *Coassus*, which embraces *Cervus rufus* and its allies. As no Deer of this form has yet been recog-

\* Mr. T. J. Moore, the Curator, writes me as follows:—"We have the type of *Cervus leucotis*, Gray, P. Z. S. Mamm. pl. xii. Its height at the shoulder is 36 inches."

nized from Western Peru, it is probably a valid species, of which we may hope to obtain perfect specimens.

"Mr. Whitely sends me the following note on this species:—'The small red Deer which Dr. Gray has had the kindness to name after me is found in the hot valleys; and I can tell nothing about its habits, as it rarely comes out into the clearing, but keeps in the depths of the forests; and if seen it is only for a moment, for its movements are very rapid, and it is quickly lost to sight amongst the dense underwood.'

"CERVUS PERUVIANUS.

"*Furcifer antisiensis*, Gray, Ann. N. H. xii. p. 162 (1873); *id.* Hand-l. of Edent. &c. p. 159, pl. xxxv. fig. 1.

"*Cervus (Coassus) peruvianus*, Gray, Ann. N. H. xiii. p. 332 (1874).

"This species is also based upon a single specimen of a female animal obtained in the Andes of Cuzco by Mr. Whitely, and now in the British Museum. Dr. Gray at first referred it to the *Cervus antisiensis* of D'Orbigny, and subsequently to the subgenus *Coassus*. It has, however, I believe I may safely say, on the authority of Sir Victor Brooke, as little to do with the one as with the other, but belongs, so far as can be told from the single skull, apparently to one of the southern diminutives of either *C. virginianus* or *C. columbianus*.

"Mr. Whitely speaks of this Deer as the 'Venado' of the natives, and says that it goes in pairs or small troops at a lower elevation than *C. antisiensis*; the horns have also a greater number of prongs.

"Whether the second skull (of a male with partly grown irregular horns) which has been referred to this species in the 'Hand-list,' and is there figured (pl. xxxv. fig. 2), really belongs to *C. peruvianus* is very doubtful. It is an old specimen received from this Society's former collection; and its locality is unknown.

"Finally, therefore, we may say that there is evidence of the existence of three Deer in Western Peru—namely *C. (Furcifer) antisiensis*, *C. (Coassus) whitelyi*, and *C. (Cariacus?) peruvianus*. In Chili two species only are known, *C. (Furcifer) chilensis* and *C. (Pudua) humilis*."

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Dr. E. Hamilton exhibited and made remarks on some deformed sterna of the Common Fowl, produced by the variety called the "Crève-cœur," and which had been persistent for six years in a farm in France.

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The following papers were read:—

1. On the Kangaroo called *Halmaturus luctuosus* by D'Albertis, and its Affinities. By A. H. GARROD, B.A., F.Z.S., Fellow of St. John's College, Cambridge. Professor to the Society.

[Received January 16, 1875.]

(Plates VII.-IX.)

During the time that H.M.S. 'Basilisk' was cruising in the region of the south-east of New Guinea one of the sailors acquired a specimen of a small Kangaroo, which Signor L. M. D'Albertis, C.M.Z.S., obtained from him at Sydney. In a letter addressed to Mr. Sclater, dated Sydney, N. S. W., December 1, 1873, Signor D'Albertis described this specimen, under the name of *Halmaturus luctuosus*, as follows\*:—"Length from the nose to the occiput  $4\frac{1}{2}$  inches; length of the ears  $1\frac{1}{4}$  inch; length of the thigh  $5\frac{1}{4}$  inches; length of the tarsus, including the nail,  $4\frac{1}{2}$  inches; length of the tail  $11\frac{1}{2}$  inches. Total length, from the nose to the tip of the tail, 2 feet 5 inches. Its weight is  $7\frac{1}{2}$  pounds.

"The fur is short, its general colour dark ashy brown with a silvery tinge, white at the roots; chin, throat, and chest white, with two horizontal ashy stripes under the pouch; on the top of the head a silvery whitish spot; the thighs more grey; feet dark, almost black; the arm white inside; the hand black. The tail moderately strong, of a similar colour to the body, but white and bare of hairs for about an inch at the extremity. The lips are barely covered with fur; the eyelids are puffed, almost naked, and provided with eyelashes so fine as not to be readily seen at first sight."

*Hab.* "S.E. of New Guinea."

On April 17, 1874, this Kangaroo was deposited by Signor D'Albertis in the Society's Gardens; and at the Meeting for Scientific Business on May 5th following, Mr. Sclater, in reporting on the additions to the Society's Menagerie†, exhibited a drawing of it, and referred to it as "the typical example of *Halmaturus luctuosus* of D'Albertis." It is this specimen, a female, which forms the subject of the present communication. It died, Nov. 24, 1874, with congested lungs, after a severe frost, the first of the commencing winter.

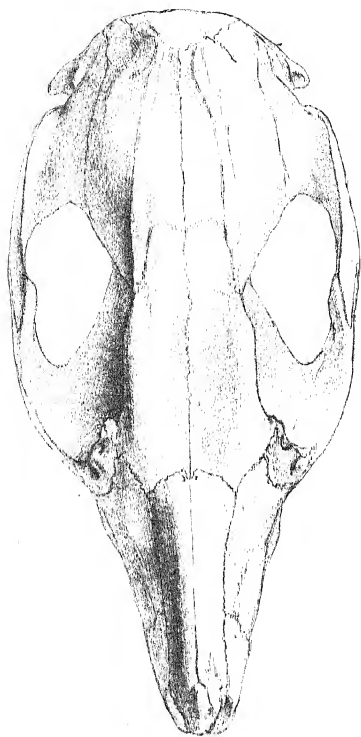
An examination of the dead body, and especially of the mouth, which it was impossible to observe in the living animal, made it evident that the species could not be rightly included in the genus *Macropus* or *Halmaturus*. Further comparison made it clear that it was intimately related to the genus *Dendrolagus*, and also to the species described in Waterhouse's 'Mammalia'‡ as *Macropus brunni*.

\* P. Z. S. 1874, p. 110.

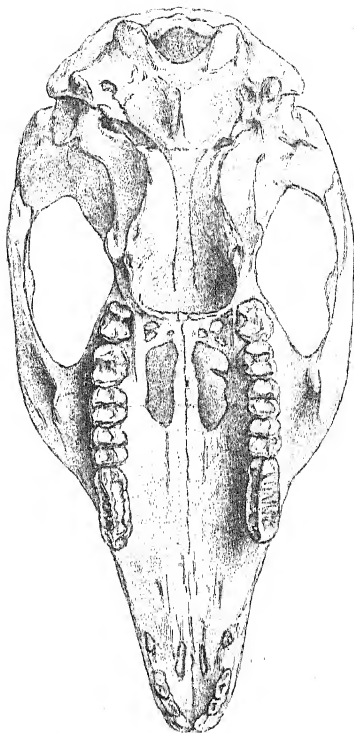
† Vol. 4. Marsupialia, p. 180.

‡ P. Z. S. 1874, p. 247, pl. xlii.

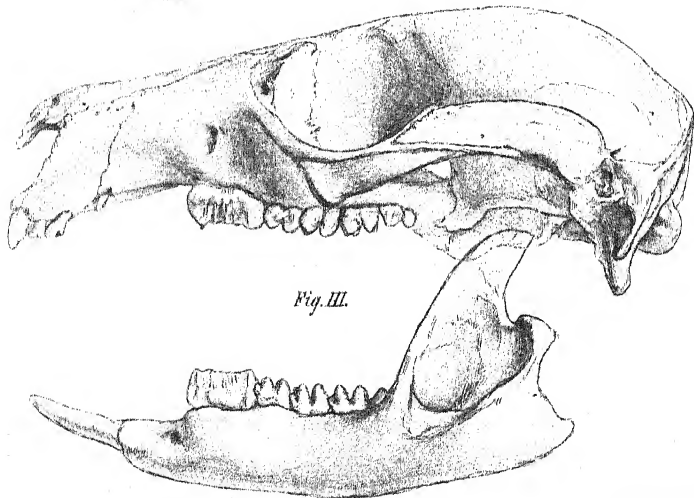
*Fig. I.*



*Fig. II.*



*Fig. III.*



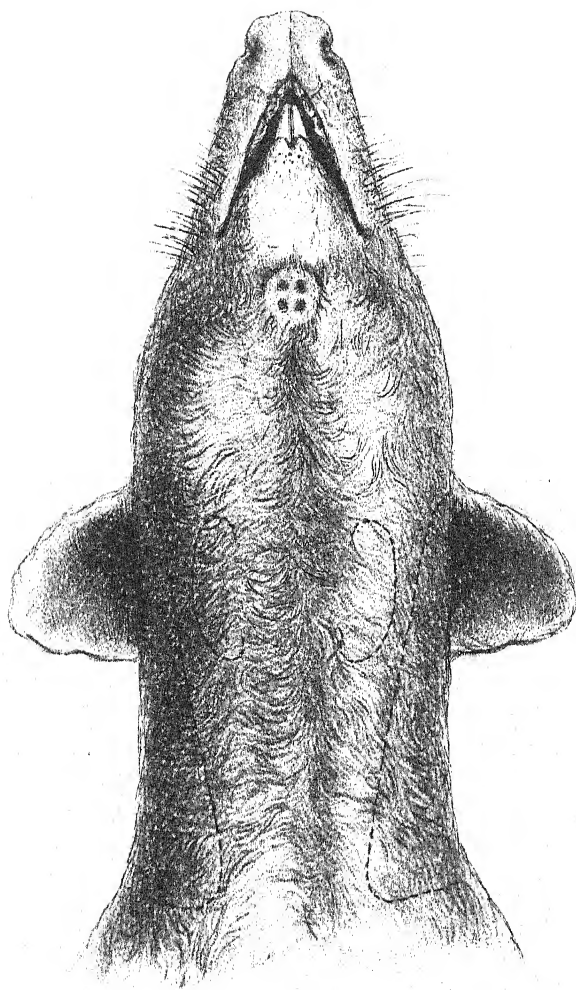
W.H. Wesley lith.

M & N. H. G. art. imp.

SKULL OF *DORCOPSIS LUCTUOSA*.





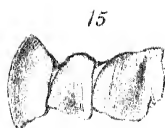


C. H. Wesley lith.

M. & N. Hornehart imp.

SUBMAXILLARY REGION OF DORCOPSIS LUCTUOSA.





W. H. W. & Co. lith.

M. H. H. & Co. lith.

1-5. TEETH OF DORONCHUS LUTIPOMUS. 6-10. TEETH OF D. MULLERI.  
11-15. TEETH OF MACROPODUS LUTUALI.



Mr. Waterhouse bases his description of this last-named species on a skin so labelled in the British Museum, and on Müller's account of the same animal in his elaborate work\*, in the letterpress of which it is termed *Dorcopsis brunii*. The priority of the generic name being undisputed, any fresh species which can be shown to be generically related to the above-determined species is evidently a species of the genus *Dorcopsis*.

This last remark is called for because the subject is rendered somewhat involved by an oversight of the illustrious Müller. In his description of his *Dorcopsis brunii* he evidently has no doubt that the specimen or specimens he is considering, is or are identical with the "Philander" described by Bruyn† as having been seen by him in the garden of the Governor of Batavia, upon which the name *brunii* was originally based. Prof. Schlegel‡, however, has most convincingly shown the unjustifiableness of this assumption, and has proved beyond a doubt that the species to which the name Philander can alone be applied is that found only in the islands of Aru and the Ké group, whilst the species which forms the subject of Müller's memoir is a denizen of New Guinea itself. Prof. Schlegel therefore retains the name *Macropus brunii* for the Philander of Aru, and of the New-Guinea animal forms the new species *Macropus muelleri*. As to me it is evident that *M. muelleri* is generically distinct from *Macropus* in its widest sense, and from all its minor divisions, it is also evident that *Dorcopsis muelleri* must be the name applied to the *Dorcopsis brunii* of Müller. The species which forms the subject of the present communication, belonging (as I hope to prove) to the same genus as *Dorcopsis muelleri* (Schlegel), must therefore stand as *Dorcopsis luctuosa* (D'Albertis).

The material at my disposal is the following:—the skin and skeleton of the type specimen of *Dorcopsis luctuosa*; the skins of an adult male and female, as well as of a young male, of *Dorcopsis muelleri* in the British Museum, collected by Mr. Wallace; a skull from the skin of the above-mentioned female of *Dorcopsis muelleri*; the much-discoloured skin of the male of the same species in the British Museum, from New Guinea, described by Mr. Waterhouse§ as *Macropus brunii*; two skeletons of *Dendrolagus inustus*, one in the British Museum and the other in the Museum of the College of Surgeons; as well as a pair of skins and an imperfect skull of *Macropus brunii* from Aru, kindly lent me by Mr. Edward Gerrard.

So far as I know, the visceral anatomy of *Dorcopsis muelleri* has not been described. That of *Dendrolagus inustus* is fully given by Prof. Owen in the 'Proceedings' of this Society||; and some of the actual specimens on which this description is based are preserved in the Museum of the College of Surgeons. The internal anatomy of *Macropus brunii* is not known.

\* Zoogdieren van den Indischen Archipel. pt. 4, pl. xxi.

† Reizen over Moskovie, p. 374, pl. 213 (1713).

‡ Nederlandsch Tijdschrift voor de Dierkunde, 1866, p. 350 *et seq.*

§ 'Mammalia,' vol. i, p. 180.

|| P. Z. S. 1852, p. 103 *et seq.*

The following Table gives the most important measurements of the skin of the female *Dorcopsis luctuosa*, compared with specimens of the same sex of *Dorcopsis muelleri* and *Macropus brunii*.

Lengths &c.	<i>Dorcopsis luctuosa</i> ♀.	<i>Dorcopsis muelleri</i> ♀.	<i>Macropus brunii</i> ♀.
	in.	in.	in.
From tip of nose to base of tail .....	24	20.25	21.0
Tail .....	13.25	15.4	11.75
From tip of nose to occiput .....	5.0	5.0	4.0
Fore limb .....	5.75	6.75	4.75
Hind limb .....	10.75	12.55	10.5
From heel to end of nail of fourth toe ...	4.75	4.75	5.0
Length of ear .....	1.4	1.25	1.75
Circumference of base of tail .....	4.25	.....	2.0
From knee to knee over the back .....	14.0	.....	17.0

The general contour of the body is quite Macropine; the breadth at the hips, however, is somewhat small. The hair is soft, short, and of a nearly uniform length all over the skin.

The head is elongate and conical, the muffle naked, the eyes large and antilopine. The colour of the upper surface and sides of the head\* and back is uniformly blackish with a silvery gloss, each hair being whitish at its base for two fifths of its length, black for the next two fifths, and white at the tip. On the ventral surface a broad longitudinal white band extends from the line joining the angles of the mouth, backwards along the neck and belly as far as the pouch, behind and from the sides of which it continues towards the tail of a true slate-colour as far as the cloacal orifice, between which spot and the base of the tail it is again white. This white band occupies the whole of the region between the angles of the jaw, and continues down the neck over the abdomen of a slightly greater width. It only encroaches on the sides of the body by sending an expansion into each axilla, which is visible laterally just behind the elbow. There is no lateral transverse white stripe across the front of the thigh, like that so strongly marked in *M. brunii*; and, unlike this last named species, the light grey, nearly white stripe above and parallel to the lip is very insignificant, and does not extend backwards under the eye.

The ear is rounded, black inside and out, with a slight white line formed by the similarly coloured roots of the there exposed hairs bounding the auditory meatus anteriorly.

The non-exposed surfaces of both the arm proper and the thigh are of a pale grey. The other parts of both the fore and hind limbs are black. The nails of both the fore and hind limbs are short and Macropine.

\* The silvery white spot on the top of the head, mentioned in D'Albertis' description, is not produced by the presence of white hair, but results from the fact that the spot where it is *sometimes* seen is the anterior junction of the forward-directed hair of the neck with the backward-directed hair of the frontal region. Its existence depends entirely on the way in which the hair is brushed; and it is not visible except after the natural disposition has been disturbed.

The peculiarity in the direction of the hair of the neck, which elsewhere occurs only in *Dorcopsis muelleri*, *Dendrolagus ursinus*, and *Dendrolagus inustus*, is as strongly marked as in those species—all the hair covering the space bounded in front by a line running transversely across the parietal region, and behind by two lines joining in the middle line between the shoulders to form a right angle seven inches behind the occiput, and extending forward and outward to the shoulder-joint, being directed forward, whilst the general body-covering of hair is directed normally backwards.

The lips are nearly naked, as is the skin covering the subsymphyseal portion of the mandible, just behind which are four large and conspicuous glandular hair-follicles in the middle line, arranged in pairs to form a square (Plate VIII.). A collection of glands of a similar nature is found on the upper eyelid, situated a little nearer the inner than the outer canthus. These are well shown in Müller's drawing of *Dorcopsis muelleri*\*. A few long hairs are to be found on the sides of the upper lip.

The eyelids are somewhat puffed, almost naked, with the eyelashes scarcely apparent.

The tail is peculiar in being of considerable diameter to near its extremity, and in being uniformly thickly covered, for all but its termination, with soft, not very short, black hair. The skin of the distal end of the tail is black, except for its terminal  $1\frac{1}{2}$  inch, where it is nearly white. On the upper part of this white portion there are a few white hairs; elsewhere it is naked and scaly. The scales are also distinctly seen extending forward for a short space over the inferior surface of the black skin, from the absence of hair in that part. The characteristic manner in which the animal employs its tail as a method of support (well shown in P. Z. S. 1874, pl. xlii.), might have almost been predicted from the above-described distribution of the hair; for it is evident that only a part at the extreme end could have habitually come into contact with the ground.

The only brown hair on the body is that in the pouch, which is rufous. There are four mammae.

There is not the least difficulty in distinguishing *Dorcopsis luctuosa* from *D. muelleri*. The general colour of the head, back, and tail in the specimens of the latter species from Mysol, above referred to, is a mouse-chocolate, which becomes duller over the thighs, and of a pale grey on the outside of the fore limb. In *D. muelleri* the general white of the abdominal surface expands slightly opposite the orifice of the pouch, just above the knees; it, however, does not develop into a band over the flank as in *Macropus brunii*: the white of the throat also extends on to the angle of the jaw, and continues forward to join the dim white stripe along the upper lip; and there is a second insignificant white line under each eye, also (as mentioned by Prof. Schlegel) not nearly so marked as in *M. brunii*. In the male of *D. muelleri* the white tip to the tail is as much as three inches in length.

The skull of *Dorcopsis luctuosa* (Plate VII.) very closely resembles

\* Loc. cit. pl. xxii.

that of *D. muelleri*, the following being the two most important measurements in adult specimens of the same sex (female):—

	<i>D. luctuosa</i> . in.	<i>D. muelleri</i> . in.
Length of skull.....	4.1	4.55
Greatest breadth, from zygoma to zygoma.....	2.2	2.05

In some minor details there are slight differences. In *D. muelleri*, as in most species of *Macropus*, the premaxillary region is bent downwards in such a way that the line formed by the trenchant edges of the molar teeth, if projected onwards to the nose, is quite above the incisor teeth. In *D. luctuosa* this bending downwards of the snout is not so marked, as will be seen by comparing the side view of the skull (Plate VII. fig. 3) and the similar one of *D. muelleri* in Prof. Müller's elaborate work above referred to.

The palatine foramina, one large one on each side, together with several much smaller ones behind each, in *D. muelleri* end behind the transverse palato-maxillary sutures, whilst in *D. luctuosa* their anterior margins are formed by the palatine plates of the maxillary bones, into which they encroach a short distance. In *D. luctuosa* the upper of the lacrymal foramina in each lacrymal bone has an ossific ridge behind it, which causes it to be completely exserted, or situated on the face outside the orbit; whilst in *D. muelleri* the absence of this bony ridge causes it to be situated in a recess on the margin of the orbit. In *D. luctuosa* the apex of the angular process which is developed downwards from the inferior margin of the maxillary portion of the zygoma, is opposite the anterior cusp of the third molar tooth, whilst in *D. muelleri* it corresponds to the posterior cusp of the second molar.

With regard to the teeth themselves, the canines in *D. muelleri* are quite the size of or even slightly larger than the most lateral incisor; in *D. luctuosa*, however, they are much smaller, being nothing more than slightly curved dentine cylinders about  $\frac{1}{15}$  of an inch in diameter, as in the subgenus *Lagorchestes*, and directed downwards and forwards. In both the species the third incisor has an inflection on its labial surface, as in all the species of *Macropus*: in *D. muelleri* this fold is a little in front of the middle of the tooth; and in *D. luctuosa* it is decidedly nearer the posterior border. In the last-named species there is a similar distinct inflection on the second incisor; in *D. muelleri* this is not apparent. In *D. muelleri* the inferior incisor is directed more immediately forward than in *D. luctuosa*, in which it turns slightly upwards; this peculiarity is correlated with the difference in the obliquity of the premaxillary region (*vide* Plate IX.).

In the enormous premolars there is a slight difference—those of *D. muelleri* being a little the larger, in the upper jaw having a breadth of 0.55 inch against 0.475 inch for the same teeth in *D. luctuosa*. In *D. muelleri* the bony septum between the two fangs of each premolar, especially of the lower jaw, is particularly con-



spicuous in the undisturbed tooth, even projecting slightly beyond the osseous alveolar margin. In *D. luctuosa* this septum is scarcely visible.

The most important characters of the skull of *Dorcopsis*, as a genus, which distinguishes it from *Dendrolagus*, are the following:— In *Dendrolagus* the head is proportionally much shorter, the effect of which on the lower jaw is that, as the dental series is not correspondingly reduced, the ramus and the body of each lateral moiety meet at a right instead of an obtuse angle; there are no palatine foramina; the zygoma is considerably deeper; the exoccipital processes are longer, though not much so; the lower incisors are considerably broader, at the same time that the upper lateral incisors are larger and more cylindrical, with superficial grooves which can scarcely be termed inflections; the premolars are not so broad, and their outer posterior tubercles are more distinctly developed.

The molar teeth of *Dorcopsis* and *Dendrolagus* are almost identical (*vide* Plate IX.).

The cranial characters which distinguish *Dorcopsis*, as a genus, from *Macropus* are not very significant. Looking at the base of the skull the arrangement of the teeth deserves attention. In *Dorcopsis* the premolar with the molars on both sides form straight lines which are exactly parallel one to the other; whilst in *Macropus* the molar-premolar series form slight curves, convex outwards, converging behind as well as in front.

In *Dorcopsis* the zygomata are not so powerful or deep from above downwards as in the similar-sized species of *Macropus*. A peculiarity also presents itself in the lateral occipital region, the exoccipitals descending considerably below the free extremities of the paramastoids in *Macropus*, whilst in *Dorcopsis* they reach downwards scarcely any further distance.

Respecting the teeth, *Dorcopsis* differs from *Macropus* in the much diminished size of the superior lateral incisors. The central incisors are not so broad, but nearly as long. The second incisor is very much smaller; and though presenting a slight inflection in *D. luctuosa*, as mentioned above, this inflection is not, as in *Macropus*, posterior and internal, at the line of contact with the anterior margin of its more lateral neighbour. The third incisor is also very much smaller. The inflection on its labial or outer surface presents the same differences in the two species of *Dorcopsis* that are found in the various species of *Macropus*: in *D. luctuosa*, as in *M. brunii* and *M. thetidis*, it is very near its posterior border; whilst in *D. muelleri*, as in *M. major* and most of the other species, it is far forward.

The inferior incisors in *Dorcopsis* are proportionally narrower than in *Macropus*, in which peculiarity *Dendrolagus* resembles the latter genus; they, however, wear down in a similar manner, namely at the anterior end of the supero-lateral margin, differently from that in the Hypsiprymniform Macropodidæ, in which they wear in a rodent-like fashion.

The presence of the superior canines in *Dorcopsis* distinguishes it

from most of the species of *Macropus*, although they are almost as well developed in the subgenus *Lagorchestes* as in *D. luctuosa*, and in that one only.

The premolars of *Dorcopsis* are particularly interesting, presenting characteristic features which are more suggestive of its affinities than any other skeletal point. As to those in the upper jaw, their breadth from before backwards is very nearly or quite as great as that of the first and second molar together with the anterior of the two cusps of the third. The crown of the tooth on each side is prismatic in shape, with one of the angles forming the cutting-edge, the opposite side the base. A tubercle on the inner surface of the posterior end of the tooth disturbs the uniformity of the prismatic shape; it is continued forward along the margin of the lingual surface as a feebly developed ridge or cingulum. Opposite it, on the labial surface, a small tubercle is also to be found, larger in *Dendrolagus*, with a similar, slighter cingular expansion.

From the thus somewhat swollen neck or cingulum several ridges with intervening depressions run at right angles, to end at the trenchant edge. These ridges differ considerably from those observed in the corresponding tooth of the genus *Bettongia*, in other points than their degree of obliquity: they are less numerous, and therefore further apart, because the tooth is considerably broader; and they are continued as what look like tumefactions of their basal ends, into both the inner and outer cingulum. It may be here mentioned that the premolars of *Hypsiprymnus* proper (*H. murinus*, *H. gilberti*, and *H. platyops*) agree much more closely with *Dorcopsis* and *Dendrolagus* in the characters in which those genera differ from *Bettongia*.

The mandibular premolars are much like those in the maxilla. They are not so broad, equalling only the two succeeding molars. They present a tumefaction or cingulum at the base of the crown; but the posterior internal and external tubercles are not developed.

In *Macropus* there is never any thing like the size of the premolars of *Dorcopsis* or *Dendrolagus*, although there is a considerable range of difference in different sections of the genus, which in *Macropus* proper appears to me to be correlated with the length of ear rather than with any other character. In *M. major* their size and permanency is but slight; and in most of the long-eared species they are not so broad as the first true molar. In *M. billardieri* and *M. brunii* they attain their maximum size proportionally; and they are nearly as large in the subgenera *Petrogale* and *Lagorchestes*. In *M. billardieri* and *M. brunii* they are almost exact miniatures of those in *Dorcopsis*, except that the number of perpendicular ridges is fewer.

Respecting the molars of *Dorcopsis* and *Dendrolagus*, they may be termed macropodiform, because, though much resembling those of the type genus, they present special characters. The two transverse prismatic ridges, with the small connecting bridge between them, are present, although the last-named structure is less conspicuous and narrower. The anterior minor ridge is also to be seen;

it is, however, much smaller and narrower than in *Macropus*; as in that genus, it is more marked in the mandibular than in the maxillary molars. The peculiar twist in the molar-premolar series of the lower jaw (the anterior teeth turning outwards and the posterior inwards), by which the trenchant edges are rendered parallel as in the upper jaw, at the same time that the rami of the mandible converge, is, as might be expected from the previously mentioned greater parallelism in the maxillary series of *Dorcopsis*, more marked in that genus than in *Macropus*. It may be mentioned that the molar teeth in *Dorcopsis* and *Dendrolagus* do not exhibit any characters intermediate between *Macropus* and *Hyposiprymnus*.

The remaining bones of the skeleton do not present features of special interest. The typical number of precaudal vertebræ are present, namely C. 7, D. 13, L. 6, and S. 2; there are 19 caudal vertebræ, with well developed chevron bones between the proximal ones. The anterior arch of the atlas presents no gap, the two moieties meeting with a linear junction. The anticlinal vertebræ are the 10th, 11th, and 12th dorsal. The clavicles are fairly developed; and the first ribs are very broad. There is a supra-condyloid foramen to the humerus; and the fibula is not ossified to the tibia. The following are the lengths of some of the most important long bones:—Humerus 2·75 inches, radius 3·2, femur 5·1, tibia 6·2, fourth metatarsal 1·8, pubic symphysis 1·7.

Respecting the soft parts, the tongue has three small circumvalate papillæ at its base, arranged in the ordinary V-shaped manner. The palate presents several strongly marked transverse ridges. The submaxillary and sublingual glands are small, the former ellipsoid in shape. The parotids are large, flat, and triangular, with their bases directed towards the root of the neck, and their apices to the masseter muscle. Their position is indicated by the dotted lines in Plate VIII.

The left lung is formed of a single lobe, with a slight fissure on the ventral margin, near the apex, opposite the broadest part of the heart. The right lung consists of two lobes, the main portion and the azygos lobe. The lobe proper presents two fissures—one near the apex, running vertebally and diaphragmatically, separating an apical lobule, the other running vertebro-apically and marking off the median lobule\*. This median lobule partly embraces the base of the heart, as in many animals. There is no third bronchus.

The heart is quite Macropine, there being two superior venæ cavæ. The right ventricle also spirally wraps round the much stronger left, as in *Macropus*.

The stomach is perfectly Macropine; that is, it is elongated, sacculated, with the œsophagus entering it much nearer the cæcal than

\* The method of description here adopted is an attempt to avoid the employment of terms which necessitate any assumption with respect to the position of the animal. Supposing the animal to have its vertebral column horizontal, and its four limbs on the ground, then the above description might be thus read:—"The lobe proper presents two fissures—one near the apex, running upwards and backwards, the other running forwards and upwards."

the pyloric extremity, with the walls of the pyloric end smooth and much thickened. The cardiac cæcal extremity, like that in *Dendrolagus* as described by Prof. Owen, consists of a single *cul-de-sac*, not a bifid one like that in *Macropus giganteus*.

In the subgenus *Petrogale* the stomach is not bifid at its cardiac extremity, in which respect it resembles *Dorcopsis*. In other respects, however, it presents considerable differences; it is more capacious opposite the œsophageal orifice, and the cardiac portion is bent on the rest nearly at right angles, which is not the case in *Macropus giganteus* and *Dorcopsis*.

The character of the mucous membrane also deserves attention. In *Macropus giganteus*, as is well known, the squamous epithelium of the œsophagus spreads over most of the stomach also, the pyloric extremity and one of the two cardiac cæca (which is itself bifid) being alone lined with a columnar coating. In *Petrogale* this latter is absent, the digestive mucous membrane being confined to the pyloric region. Of *Dendrolagus inustus* Prof. Owen remarks\*, "the epithelium is continued from the œsophagus, for a breadth of 2 inches down the posterior surface of the stomach, and of 1½ inch down the anterior surface, and thence is continued, slightly diminished in breadth, 3 inches towards the pyloric end of the stomach, and 2½ inches towards the cardiac end. The rest of the cavity is lined with the usual gastric vascular membrane, the surface of which is diversified by patches of follicular apertures along the upper curvature of the stomach, which patches increase in breadth as they approach the true digestive portion." A very similar condition maintains in *Dorcopsis luctuosa*, the only difference being that the squamous lining covering the whole of the cardiac *cul-de-sac* is also found to spread from the œsophageal orifice along the lesser curvature for a short distance towards the pylorus. As in *Dendrolagus inustus*, two strong parallel longitudinal folds run from the œsophageal opening, in this squamous-covered mucous membrane, for some distance on the way to the pyloric compartment, gradually disappearing before they reach it.

The small intestine is 97 inches in length, with numerous oblong Peyer's patches distributed throughout its whole distance, averaging 1½ inch long, by ½ inch across. The cæcum and large intestine are not sacculated; the former has a length of 2½ inches, and its circumference is the same; the latter is 32 inches long, being one third the length of the small intestine, which is the same proportion that Prof. Owen† observed between the same-named viscera of *Dendrolagus inustus*. The equally short cæcum in the *Hypsiprymni* differs in having two lateral longitudinal bands which scarcely sacculate it.

The spleen is perfectly Macropine, being narrow and elongate, with a well-developed third lobule.

The liver very closely resembles that of the different species of *Macropus*. In comparing the livers of different animals it is my habit to estimate by sight, and therefore only approximately, the bulk of the different lobes, and to write down the results in the

\* P. Z. S. 1852, p. 105.

† P. Z. S. 1852, p. 106.

form of a formula. Employing the divisions, so evidently natural, proposed by Prof. Flower, I commence by writing down the name of the largest lobe, after which the others in the order of their bulk, with symbols between each to indicate their relative size. Taking the liver-formula of *Dorcopsis luctuosa* as an example, it may be thus written,

$$\text{L.L. } 2 > \text{C. } \frac{1}{2} > \text{R.C. } \frac{1}{2} > \text{Sp.} > \text{R.L. } 2 > \text{L.C.};$$

and it reads as follows:—The left lateral lobe (L.L.) is the largest; it is twice the size of the caudate (C.), which is half as large again as the right central (R.C.), which is half as large again as the Spigelian (Sp.), which is larger (very little) than the right lateral (R.L.), which is twice the size of the left central (L.C.).

The similarly constructed formula of *Macropus melanops* is

$$\text{L.L.} = \text{C. } 2 > \text{R.C. } \frac{1}{2} > \text{R.L. } \frac{1}{2} > \text{Sp. } 3 > \text{L.C.},$$

and of *Halmaturus derbianus*

$$\text{L.L. } \frac{3}{4} > \text{C} = \text{R.C. } \frac{1}{2} > \text{Sp. } \frac{1}{2} > \text{R.L. } 2 > \text{L.C.} :$$

they show how great a similarity there is between the different members of the family *Macropidae*.

The gall-bladder is situated in the deep cystic fossa; and the umbilical fissure is not deep. The Spigelian lobe has its apex directed vertebrally and resting on the left lateral lobe, as in *Macropus*; no secondary lobules are connected with it.

There is a peculiarity in the liver of the specimen of *Dorcopsis luctuosa* under consideration, which may be individual, or it may be characteristic of the species, genus, or subfamily; at all events, I have not seen it in any other mammalian animal. Looking at the diaphragmatic surface of any multilobate liver, the lateral margins of the mass formed by the right and left central lobes are always seen to overlap, to a greater or less extent, the lateral lobes in an imbricate manner. Similarly the right lateral lobe overlaps or covers the caudate. In the livers of *Macropus* and *Halmaturus* which I have by me, this conformation is strictly maintained. But in *Dorcopsis luctuosa* the caudate lobe overlaps the right lateral lobe (instead of being situated on its abdominal surface), in such a way that the last-named lobe is only seen between the right free edge of the right central lobe and the left free edge of the caudate. This condition is not brought about by any *post mortem* change in the position of the lobes, because the right lateral fissure is not so deep as to separate them at their vertebral extremity.

The uterus is perfectly Macropine, as are the vaginæ. No direct communication could be found between the uterine pouch of the vaginæ and the common vaginal canal.

A gland, as usual, about the size of an almond, with a slender duct, opens on each side of the narrow cavity included between the sphincter ani and the external common sphincter.

In conclusion, the comparison of the various organs and structures

of the Macropodidæ which have come before me in my study of *Dorcopsis luctuosa* would lead me to divide up the family in the following manner:—

Family MACROPODIDÆ. Diprotodont Marsupialia wanting the hallux, the second and third digits of the pes being much reduced and included in the skin as far as the ungual phalanges, which at the same time have the claws so formed that the inner is convex inwards and the outer convex outwards, at the same time that their contiguous surfaces are flattened. The stomach is elongated and sacculated.

Subfamily MACROPODINÆ. Macropodidæ in which the œsophagus enters the stomach near the cardiac end; with a Spigelian lobe to the liver; with no lateral longitudinal bands to the colic cæcum when it is short, and with radius of normal form.

Section 1. MACRUPUS. With the premolars never much larger than the first molar; with a characteristic molar tooth-pattern; with the stomach but slightly lined with digestive epithelium(?) and with the hair on the nape of the neck directed backwards. *Hab.* Australia, Tasmania, Aru, and the Ké Islands.

Genera or subgenera. *Macropus*, *Halmaturus*, *Petrogale*, *Lagorchestes*.

Section 2. DORCORSIS. With the premolars strikingly large, with a characteristic molar-tooth-pattern, slightly modified upon that of *Macropus*; with the stomach mostly lined with digestive epithelium, and with the hair of the nape of the neck directed forwards. *Hab.* New Guinea and Mysol.

Genus 1. *Dorcopsis*. Limbs Macropine in their proportions.

Genus 2. *Dendrolagus*, *Protemnodon*\*, *Sthenurus*\*. Fore limbs much longer than in *Macropus*.

Subfamily HYPSPRYMNINÆ. Macropodidæ in which the œsophagus enters the stomach near the pyloric end; with no special Spigelian lobe to the liver; with lateral longitudinal bands to the short colic cæcum; with a much-flattened and expanded radius, with a characteristic molar-tooth-pattern, and with the incisors worn down much as in Rodent animals. *Hab.* Australia and Tasmania.

Genus *Hypsiprymnus* (including *H. murinus*, *H. gilberti*, and *H. platyops*). Auditory bulla somewhat inflated; palatine foramina, one large one on each side; ridges on premolars few and perpendicular. Face clongate.

\* An inspection of the plates in Prof. Owen's paper on these new genera (Phil. Trans. 1873, p. 245), makes it evident that they are scarcely distinguishable from *Dendrolagus*, and must be included in the *Dorcopsis* section of the family.

Genus *Bettongia* (including all the others of the group except *B. rufescens*). Auditory bulla much inflated; palatine foramina as in *Hypsiprymnus*; ridges on premolars numerous and oblique; head short.

Genus *Æpyprymnus*\* (including only *Bettongia rufescens* of Gould). Auditory bulla not inflated; palatine foramina absent; head short; tarsus considerably longer than in the two other genera.

It should be mentioned that the visceral anatomy of *Æpyprymnus rufescens* has not been published, and that Mr. Waterhouse divides the genus *Hypsiprymnus* into three subgenera corresponding exactly with the three genera here defined.

My best thanks are due both to Mr. Sclater and to Dr. Günther for the very kind way in which both these gentlemen have assisted me in my study of this subject.

#### EXPLANATION OF THE PLATES.

##### PLATE VII.

Lateral superior and inferior views of the skull of *Dorcopsis luctuosa*, natural size.

##### PLATE VIII.

View of the inferior surface of the neck of *Dorcopsis luctuosa*, showing the median gland with four orifices situated in the hyoid region. The positions of the large parotid and small submaxillary glands are indicated by dotted lines.

##### PLATE IX.

Teeth, twice the natural size, of (figs. 1-5) *Dorcopsis luctuosa*, (figs. 6-10) *Dorcopsis müllerti*, and (figs. 11-15) *Macropus brunii*. The upper two rows represent the left upper premolar, the third and fourth rows the upper and lower third left molar, and the bottom row the incisors.

## 2. On some rare Parrots living in the Society's Gardens.

By P. L. SCLATER, M.A., Ph.D., F.R.S., Secretary to the Society.

[Received January 30, 1875.]

(Plates X. & XI.)

The determination of the Parrots in the Society's collection, aided by Dr. Finsch's excellent Monograph, I do not usually find a difficult task. But several of the more recent accessions have caused me some little trouble, and rendered investigations necessary, concerning the results of which, I think, a few notes may be acceptable to naturalists.

In the Society's 'Proceedings' for 1871 (p. 490 *et seq.*) I distinguished a new species of white Cockatoo from a specimen living in the Gardens as *Cacatua gymnopis*†, and took occasion to point out the differences between it and its two allies *Cacatua ducorpsi* and *C. sanguinea*, of which living examples were also then in the collection.

\* This term I propose for Mr. Waterhouse's first section of *Hypsiprymnus*, which he has left without any Latin name.

† The type of this species is still alive in the Gardens; and we have also a second specimen, purchased Feb. 15, 1872.

A recent examination of the living specimens of White Cockatoos now in the Society's Gardens has convinced me that we have at the present moment examples of a fourth, nearly allied species, which I had not previously recognized. This is the *Cacatua goffini* described by Finsch\* in 1863 from a specimen living in the Gardens of the Zoological Society of Amsterdam. Of this bird we have now three examples alive in the Parrot-house, which have been hitherto wrongly named *Cacatua ducorpsi*†. I also exhibit a skin of the same species from the collection of Messrs. Salvin and Godman. This specimen is of great interest, as it was obtained by Mr. J. T. Cockerell at Coomara in Queensland, about 30 miles from Brisbane, and thus fixes the habitat of *C. goffini*, which was not previously known‡.

I have no means of pointing out the precise differences between *C. goffini* and *C. ducorpsi* of the Solomon Islands, no specimen of the latter being accessible. But it would seem that in *C. ducorpsi* the

Fig. 1.

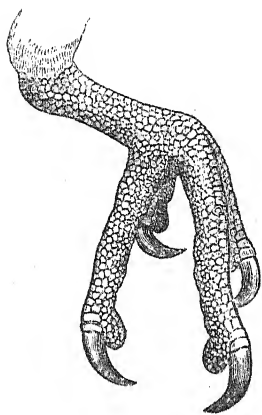
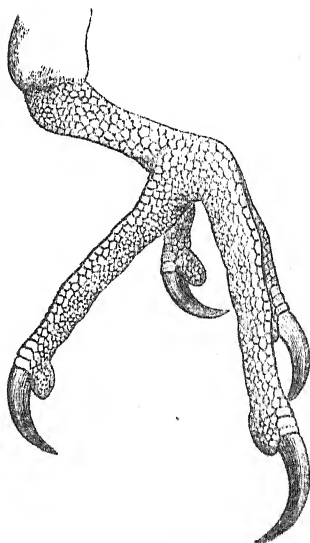
Foot of *Cacatua goffini*.

Fig. 2.

Foot of *Cacatua sanguinea*.

interior of the crest is lemon-yellow, not rosy red as in *C. goffini*§.

\* *Ptilotopus goffini*, Finsch, Papag. i. p. 308.

† The first is labelled as having been "purchased in 1864;" but this is probably an error; the second was presented by Mr. C. Turner in June 1871, and the third presented by Mr. S. F. Deane in October last year.

‡ Mr. Cockerell tells me he shot this bird in December 1873, out of a flock of the ordinary *Cacatua galerita*, and never met with a second specimen.—P. L. S.

§ I think it possible that the specimen which I spoke of (P. Z. S. 1871, p. 490) as *C. ducorpsi* may not have been really one of the original pair of this species, but an example of *C. goffini*. In spite of every care, labels on living birds are occasionally misplaced, and confusion thus arises.



and that the rosy tinge at the bases of the neck- and breast-feathers is wanting.

From *C. sanguinea*, with which it has been hitherto generally confounded, *C. goffini* is distinguishable not only by the characters pointed out by Dr. Finsch, but also by its much shorter and comparatively thicker toes and claws. This will be at once apparent upon comparing the specimen with the original type of *C. sanguinea*, which Mr. Gould has kindly lent me (see figures, p. 60).

It appears, therefore, that there are *three* different species of the smaller division of White Cockatoos living in Australia, namely :—

1. *CACATUA SANGUINEA*, Gould, from North Australia, figured, Gould, B. Austr. v. pl. 3. The only certain locality for this species appears to be Port Essington, where Mr. Gould's type was obtained.

2. *CACATUA GYMNOPI*S, Sclater, from the interior of South Australia\*.

Of this species I exhibit a beautiful figure of the typical specimen described P. Z. S. 1871, p. 493, which Mr. Gould has prepared for his second Supplement to the 'Birds of Australia.'

Both these species are perhaps more correctly referable to *Licmetis*, with which they agree in their long slender toes (see fig. 2, p. 60), naked skin round the eye, and more compressed bill. *C. gymnopsis* is certainly intermediate between *C. sanguinea* and *Licmetis nasica*. It is a larger species than *C. sanguinea*.

3. *CACATUA GOFFINI* (Finsch), from Queensland, of which I likewise show a drawing by Mr. Smit (Plate X.) from one of our living specimens.

Passing to the American Parrots now or lately in our collection, I exhibit the skin of a very fine example of *Chrysotis guatemalæ*, Hartlaub, with the blue head well developed†, the only living example I have ever met with of this species.

I also exhibit an accurate drawing by Mr. Smit (Plate XI.) of *Chrysotis bouqueti* (Bechst.), one of the rarest and least-known species of this extensive genus, from the individual living in our Gardens. I have noticed the arrival of this specimen on a former occasion (see P. Z. S. 1874, p. 323); but it was then in bad plumage. Edwards's figure, upon which the species was originally based, was likewise taken from a living specimen; and there is no example of it in any Museum known to Dr. Finsch. Its correct habitat is, as I had previously conjectured (see P. Z. S. 1874, p. 324), the island of St. Lucia, where Mr. Nevill Holland obtained a living example, which is now in his possession.

Besides these specialities, we have at present examples of several

\* As already stated (P. Z. S. 1871, p. 490), there is a specimen of this species in the British Museum, collected by Sturt in the interior of South Australia. It is therefore no doubt the *Cacatua sanguinea* of the Appendix to his 'Travels in Central Australia,' ii. p. 36. In Messrs. Salvin and Godman's collection is also a skin of this bird, obtained from Adelaide, and probably from the same district.

† Purchased April 21, 1870; died Nov. 10, 1874.

other little-known species in our Parrot-house, such as *Chrysotis viridigenalis*, *Lorius tibialis*, *Eos reticulata*, *Pyrrhulopsis tabuensis*, *P. personata*, and *Coracopsis barklyi*.

The whole series of birds of the family in the building consists at the present moment of 186 specimens, belonging to 115 species.

### 3. List of the Mammals and Birds collected by Mr. Waters in Madagascar. By EDWARD BARTLETT, Curator of the Museum and Public Library, Maidstone.

[Received December 31, 1874.]

(Plate XII.)

I have the pleasure of forwarding to the Society a list of the Mammals and Birds collected by Mr. Waters in Madagascar, which I have observed from time to time in his collections on their arrival, thinking that it may be useful for reference as regards his specimens obtained in that island.

#### MAMMALS.

##### 1 LEMUR VARIUS, Geoffr.

Interior of Madagascar.

A number of flat skins were in a former collection, and one male and three females are in the present collection, of the black-and-white variety, from the S.E. coast. The sexes are alike in colouring.

##### 2. LEMUR MELANOCEPHALUS (Gray).

Interior of Madagascar.

Male and female of this species in a former collection. They are alike. The head of the male is perhaps a little blacker than the female's.

##### 3. HAPALEMUR GRISEUS, Geoffr.

Tamatave.

A female in the first collection.

##### 4. CHIROGALEUS TYPICUS, Smith.

Tamatave.

A single skin in the first collection.

##### 5. CHIROGALEUS SMITHII, Gray.

S.E. coast of Madagascar.

A female in the present collection.

##### 6. PROPITHECUS DIADEMA, Bennett.

Tamatave and the interior of Madagascar.

Several imperfect flat skins were in the first collection, which varied much in colour, some being iron-grey on the shoulders with pale yellowish fore limbs, and others rich red brown on the fore limbs. In a second collection I received a fine skin in which the red-brown of the limbs was extremely rich, and the grey colour on the shoulders very bright and silvery.

7. *PROPITHECUS EDWARDSI*, Grand.

The two males received from the S.E. coast of Madagascar are brownish black, with the loins yellowish brown, darkish on the middle of the back and belly.

8. *PROPITHECUS CORONATUS*, Grand.

Interior of Madagascar.

Male, female, and young in a former collection. The young one was about half-grown, with the black of the head extending down the neck, and intermixed with brown and yellowish white on the shoulders and fore limbs; loins, hind limbs, and tail yellowish white.

9. *PROPITHECUS DECKENI*, Peters.

Interior of Madagascar.

Two males in a former collection:—one all yellowish white with a blackish spot on the back of the neck; the second was entirely white without the spot.

10. *INDRIS BREVICAUDATUS*, Geoffr.

East of Tamatave.

In a former collection I received a specimen of this species, which was black with the loins white.

11. *CHIROMYS MADAGASCARIENSIS*, Geoffr.

Interior of Madagascar.

A male received in a former collection.

12. *PTEROPUS VULGARIS*, Geoffr.

Tamatave.

13. *PTEROPUS EDWARDSII*, Geoffr.

Males, females, and young are in the present collection, from the S.E. coast of Madagascar.

14. *TAPHOZOUS MAURITIANUS*, Geoffr.

S.E. coast of Madagascar.

A single skin of this rare Bat is in the present collection, called "Manave." Mr. G. E. Dobson has kindly determined the species for me.

15. *CRYPTOPROCTA FEROX*, Bennett.

S.E. coast of Madagascar.

A fine female is in the present collection.

16. *VIVERRICULA SCHLEGELI*, Pollen.

S.E. coast of Madagascar.

Several fine specimens of males, females, and young are in the present collection.

In my specimens of this species the whole of the palm-pad proper and also the pads of the toes are entirely naked.

The skins now before me vary much in colour, some being of a

very pale grey, others of a reddish brown, with the spots less distinct. The colours evidently depend upon the age, because the old female (that was suckling the young at the time she was killed) is much larger and paler in colour than the rest.

Called by the natives of the S.E. coast "Alungar."

17. *GALIDIA ELEGANS*, Geoffr.

S.E. coast of Madagascar.

A female and a young one about half-grown are in the present collection.

The colours of the young are exactly the same as in the adult.

18. *ERICULUS NIGRICANS*.

Tamatave.

19. *CENTETES ECAUDATUS*, Illiger.

One pale-coloured specimen in a former collection from Mauritius, and several reddish-brown specimens from the S.E. coast of Madagascar.

20. *POTAMOCHÆRUS EDWARDSI*. (Plate XII.)

*Potamochoerus edwardsi*, Grand. Rev. Zool. 1867, p. 318; Gray, Ann. N. H. ser. 4, vol. xv. p. 47 (1875).

*Potamochoerus africanus*, Gray, P. Z. S. 1874, p. 206.

*Sanglier de Madagascar*, Daubenton; Buffon, N. H. xiv. p. 396; Flacourt's Hist. Madagascar, p. 151.

*Potamochoerus* —, Gray, P. Z. S. 1868, p. 38.

*Potamochoerus madagascariensis*, Gray, Cat. Mamm. B.M. p. 344 (1869).

Mr. Waters, in a note to me, says:—"I send the skin and skull of a small species of Wild Boar found on the lowlands, and called "Lamboneive," differing from the upland Wild Boar, which is much larger and called "Lambohava."

The skin and skull now exhibited appear to be referable to the adult of the same animal as that which Dr. Gray described (*l. s. c.*) as the young of *P. africanus*, from a specimen received through me from the same collector.

Mr. Smit's drawing (Plate XII.) is taken from the skin now exhibited.

## BIRDS.

1. *BUTEO BRACHYPTERUS*, Pelz.

S.E. coast of Madagascar.

A young female is in the present collection.

2. *TINNUNCULUS NEWTONI*, Gurn.

Andradia, Madagascar.

Specimens were in a former collection.

3. *POLYBOROIDES RADIATUS*, Scop.

East of Tamatave.

An adult female from this locality in a former collection, an adult

male and two young females from Andradia, and a fine adult male in the present collection from the S.E. coast of Madagascar.

4. *BUBO MADAGASCARIENSIS*, Smith.

S.E. coast of Madagascar.

One specimen of this rare bird is in the present collection, called by the natives of the S.E. coast "Vorong-ong-kong."

5. *STRIX FLAMMEA*, Pall.

In a former collection from Tamatave.

6. *EURYSTOMUS GLAUCURUS*, Müll.

Tamatave.

Many specimens in former collections.

7. *CORYTHORNIS CRISTATA*.

Tamatave.

Several specimens in former collections taken near the above locality.

8. *ISPIDINA MADAGASCARIENSIS*, L.

S.E. coast of Madagascar.

Two males and a female of this lovely species are in the present collection, called "Vince-anala" by the natives of the S.E. coast.

9. *MEROPS SUPERCILIOSUS*, L.

East of Tamatave.

Both sexes in former collections.

10. *NECTARINIA SOUIMANGA*, Gm.

East of Tamatave.

Specimens of both sexes in former collections; and two immature males are in the present collection, from the S.E. coast of Madagascar.

11. *ZOSTEROPS MADAGASCARIENSIS*, L.

Tamatave.

In former collections.

12. *CISTICOLA MADAGASCARIENSIS* (Hartl.).

Tamatave.

In a former collection.

13. *EROESSA TENELLA*, Hartl.

Tamatave.

In a former collection.

14. *ELLISIA TYPICA*, Hartl.

Tamatave.

15. *PRATINCOLA SYBILLA*, Gm.

Interior of Madagascar.

Both sexes in former collections.

16. *COPSYCHUS PICA*, Pelz.

Interior of Madagascar.

Two specimens.

17. *GERVAISIA ALBISPECULARIS*, Eyd.

Interior of Madagascar.

A single specimen.

18. *HYPSIPETES MADAGASCARIENSIS*, Müll.

East of Tamatave.

A pair received in the first collection with the nests and eggs.

19. *DICRURUS FORFICATUS*, L.

Tamatave.

20. *LEPTOPTERUS BICOLOR*, L.

Tamatave.

A single specimen in a former collection, and one in the present from the S.E. coast of Madagascar.

21. *TCHITREA MUTATA*, Gm.

Ankavandra, interior of Madagascar.

Male and female in a former collection.

22. *CEBLEPYRIS CINEREA*, Müll.

Ankavandra, interior of Madagascar.

One specimen only.

23. *VANGA CURVIROSTRIS*, Gm.

Tamatave.

In a former collection.

24. *VANGA ? DAMI*, Schl.

S.E. coast of Madagascar.

Two adults and one young are in the present collection.

25. *CORVUS MADAGASCARIENSIS*, Bp.

Tamatave.

26. *FOUDIA MADAGASCARIENSIS*, L.

Tamatave.

27. *AMADINA NANA*, Pucher.

Tamatave.

Eggs pure white.

28. *CORACOPSIS NIGRA*, L.

Tamatave.

Skin and skeleton of this species in a former collection.

29. *COUA GIGAS*, Bodd.

Ankavandra, interior of Madagascar.

30. *COUA CÆRULEA*, L.

Tamatave and the interior of Madagascar.

31. *COUA CRISTATA*, L.

Tamatave and interior of Madagascar.

32. *CENTROPUS TOULOU*, Müll.

Tamatave.

33. *TRERON AUSTRALIS*, Mont.

Tamatave.

34. *TURTUR PICTURATUS*, Temm.

Interior of Madagascar.

35. *PTEROCLES PERSONATUS*, Gould.

Interior of Madagascar.

Male and female in a former collection.

36. *TURNIX NIGRICOLLIS*, Gm.

S.E. coast of Madagascar.

Four eggs of this species are in the present collection.

Ground-colour white, freckled all over with minute spots of pale brown and grey; a number of large dark brown spots are distributed over the surface.

37. *ÆGIALITIS TRICOLLARIS*, V.

Ankavandra, interior of Madagascar.

38. *ARDEA PURPUREA*, L.

Tamatave.

One specimen in former collection, and one in the present from the S.E. coast, both young birds.

39. *ARDEA ARDESIACA*, Wagl.

S.E. coast of Madagascar.

A single specimen is in the present collection.

40. *ARDEA FLAVIROSTRIS*, Temm.

Tamatave.

41. *ARDEA IBIS*, Hasselq.

Tamatave.

42. *ARDEA COMATA*, Pall.

Tamatave.

43. *ARDETTA PODICEPS*, Bp.

Interior of Madagascar.

44. *BUTORIDES ATRICAPILLA*, Afzel.

Tamatave.

45. *SCOPUS UMBRETTA*, Gm.

Tamatave and the interior.

46. *FALCINELLUS IGNEUS* (Gm.).

A single skin of this rare bird (from the S.E. coast) is in the present collection.

47. *GERONTICUS CRISTATUS* (Gm.).

Interior of Madagascar.

A pair in a former collection, and two males and a female in the present collection. They inhabit the dense forests, living in large trees.

48. *HIMANTOPUS CANDIDUS* (Bonn.).49. *RHYNCHÆA CAPENSIS*, L.

A skin is in the present collection from the S.E. coast of Madagascar.

50. *EULABEORNIS BERNIERI*, Bp.

Two males and two females are in the present collection from the S.E. coast of Madagascar, the sexes differing but little in colour or markings.

51. *CORETHRURA INSULARIS*, Sharpe.

Interior of Madagascar.

52. *PORPHYRIO SMARAGNOTUS*, Temm.

Tamatave.

53. *PORPHYRIO ALLENI*, Thomps.

Tamatave.

54. *GALLINULA PYRRHORRHOA*, Newt.

A pair of this species with the eggs were in a former collection from Tamatave.

55. *METOPODIUS ALBINUCHA*, Geoffr.

Tamatave.

56. *NETTAPUS AURITUS*, Bodd.

Tamatave.

57. *DENDROCYGNA VIDUATA*, L.

Tamatave.



58. *QUERQUEDULA HOTTENTOTA*, Smith.

Tamatave.

59. *SARCIDIORNIS AFRICANA*, Eyton.

Tamatave.

A female from the above locality; and a fine male is in the present collection from the S.E. coast, with several eggs of a creamy white colour with a dull smooth surface, like the egg of *Cairina moschata*.

60. *GRACULUS AFRICANUS*, Gm.

S.E. coast of Madagascar.

Two males and three females are in the present collection, in different stages of plumage.

Called "Ramangavia" by the natives of the S.E. coast.

#### 4. Notes on the Original Specimen of *Ptilonorhynchus rawnsleyi*. By E. P. RAMSAY, C.M.Z.S.

[Received December 31, 1874.]

Having recently had an opportunity of examining the original specimen of *Ptilonorhynchus rawnsleyi*, I beg leave to offer to the Society a few remarks on this curious bird.

The whole of the plumage of this specimen is of a shining bluish black, intermediate in tint between that of the male Regent bird (*Sericulus chrysocephalus*), and that of the Satin bird (*Ptilonorhynchus holosericeus*). On the primaries is a broad band of bright golden yellow, beginning at 2·5 inches from the upper edge of the shoulder; this band or patch of yellow extends to the tips of the secondaries; the outer webs of the feathers from the seventh primary are divided as in the adult male Regent bird. The two outer tail-feathers are margined with pale yellow on their outer edge; the three next on each side are just touched with the same tint, except the centre pair, which are touched with a deeper tint of orange-yellow; the outer tail-feathers are margined on their inner webs with pale brownish yellow. The feathers of the head are short, resembling those of the adult male Regent bird; the feathers on the crown of the head and those extending over the back of the head to the nape have a patch of orange colour near the centre of the end of each feather; the outer edge of this spot, where it joins the narrow blackish blue margin, is of a deeper orange tint, some feathers having a line of bluish black down the centre along their shafts, dividing the orange-coloured spot in half; the extreme narrow margin of all these feathers is of a bluish black, of the same tint as the rest of head- and neck-feathers\*.

\* The orange-coloured markings on these feathers do not show conspicuously, unless the feathers on the crown are raised, when, however, they are easily seen. The moment the skin was handed to me, I noticed them, and was greatly surprised that this very important mark of hybridism had been apparently overlooked by Mr. Gould (Suppl. B. Austr. pl. 34) and Mr. Diggles (Ornith. Austr. pl. 52), both of whom have figured the bird from this identical skin.

After a close examination of the specimen, I do not see how any unbiased naturalist can have any doubt of its being a hybrid, it is so perfectly intermediate in form, size, and coloration between the adult males of the Regent and Satin Bower-birds. The shape and contour of the bill, the colour of the iris, the manner in which the bird is marked, and the shape and form of these markings all tend to prove its hybridism. Added to this, the fact that the bird was shot out of a troupe of Satin Bower-birds, in a neighbourhood frequented by Regent birds, a few miles out of Brisbane, is to my mind quite sufficient proof that it is an accidental hybrid between these species. If *Ptilonorhynchus rawnleyi* were really a valid species, surely other examples of it would have been found near the same locality; but so far as I can learn, up to the present time no reliable evidence has been obtained of any more having been since procured or even seen in any part of Australia.

5. Contributions to the Ornithology of Madagascar.—Part IV.\* By R. BOWDLER SHARPE, F.L.S., F.Z.S., of the Zoological Department, British Museum.

[Received February 1, 1875.]

(Plates XIII. & XIV.)

Since my last communication on this subject (P. Z. S. 1872, p. 866) I have examined several Madagascar collections, notably three received by Mr. A. Boucard of Great Russell Street; but these did not contain any novelties, although some few rarities will be found mentioned in this paper. By Mr. Cutter's kindness, however, I have been permitted to examine a very fine collection recently sent home by my old correspondent Mr. Crossley, whose investigations in the wonderful island of Madagascar will for ever connect his name with the natural history of that part of the world. This last consignment contained many rare species mentioned by me in former papers—such, for instance, as *Brachypteracias leptosomus*, *Geobiastes squamigera*, *Atelornis pittoides*, *Philepitta castanea*, *Oxyulabes madagascariensis*, *Mystacornis crossleyi*, *Pseudobius wardi*, *Corethrura insularis*, &c. At present we are unable to state precisely the exact locality where these collections of Mr. Crossley have been made; for the letter which usually accompanies his consignments has, in this instance, miscarried, and all the clue I can find to his whereabouts is the name "Ampasmonhavo" on the tickets of some of his birds. Here he collected the new *Atelornis* and a *Phedina*; but I cannot find the place in the map. It is probably between Antananarivo and Moroundava, for which place Mr. Crossley was making when we last heard of him.

\* Cf. P. Z. S. 1870, p. 384; 1871, p. 313; 1872, p. 866.

## Family FALCONIDÆ.

## Subfamily ACCIPITRINÆ.

CIRCUS MACROSCELIS, A. Newton; Sharpe, Cat. B. i. p. 73.

The British Museum has recently acquired from Mr. Boucard an adult specimen of a Harrier; and this has at last given us some idea of the affinities of *C. macroscelis*. The discovery of this stage of plumage is of very great interest; for at present we know of only one specimen of a *Circus* from Madagascar, the type of *C. macroscelis* of Prof. Newton, described in these 'Proceedings' more than eleven years ago. Notwithstanding the frequent visits of collectors to the island, no one has before succeeded in getting the Harrier, which, being founded on an immature specimen, has always been difficult of identification; and when I wrote the first volume of my 'Catalogue of Birds' I had not seen the species (Cat. B. i. p. 73). Its chief peculiarity lay in the long leg, measuring 4 inches in the tarsus; and as the only other Harrier which has such a lengthened tarsus is the Australian *C. gouldi*, Professor Schegel has recently suggested the identity of the two birds. The arrival of an adult specimen enables us to arrive at the true affinities of the Madagascar Harrier, which, as might have been expected, are with *C. maillardi* of Réunion; indeed the question now to be solved is whether it is not specifically identical with that bird. It is certainly very close indeed, resembling *C. maillardi* in the uniform wing-lining, the quills having no bars; but our example differs in having the upper tail-coverts barred with brown, and the tail with seven bands. Mr. Gurney has most kindly interested himself in the question of these Harriers; and the authorities of the Norwich Museum with the utmost liberality have sent me up for examination a young bird from Réunion, an adult bird from Joanna Island, and the type of *C. macroscelis*. The Joanna specimen agrees perfectly with our Madagascar bird, and like it has barred upper tail-coverts and tail. Mr. Gurney also informs me that a second Joanna specimen is in the Norwich Museum and likewise has the upper tail-coverts barred. There is, however, to my mind, such a decided appearance of change in these bars that I cannot bring myself to attach much specific importance to them; for they are not bold and decided cross bands, but rather faintly disappearing bars, not exactly the same on any two feathers, and more strongly indicated on the Madagascar than on the Joanna example, the latter being, to my mind, rather more adult. The typical *C. macroscelis* I regard either as an old female or an immature bird in its second plumage, intermediate between its brown or "Marsh-Harrier" dress and the fully adult livery. It must be borne in mind, however, that it was sexed a male by Mr. Edward Newton; and therefore it is possible that it is an immature bird, as above suggested, though the size gives the idea that probably a mistake took place in the sexing.

All the characters, then, that can be brought forward for the separation of *C. macroscelis* from *C. maillardi* are the barred upper tail-coverts and the bands on the tail. Possibly the young birds may be different; and this will be the case if Madagascar and Joanna never

produce a uniform "Marsh-Harrier" plumage for their Harrier, while Réunion birds never show the striped breast; but these are characters which only a large series can determine.

I subjoin the measurements of all these Harriers examined by me up to the present time.

	Total length. in.	wing. in.	tail. in.	tarsus. in.
Juv. Réunion ( <i>mus. Lugd.</i> ) . . . .	20	13·9	..	3·05
Ad. Réunion ( <i>mus. Lugd.</i> ) . . . . .	20	14·1	9·3	3·35
Juv. Réunion ( <i>mus. Lugd.</i> ) . . . .	22	15·2	10·0	3·5
Ad. Joanna ( <i>mus. Norv.</i> ) . . . . .	22	16·8	10·5	3·7
Ad. Madagascar ( <i>mus. Brit.</i> ) ..	22	16·9	11·0	3·55
Imm. Madagascar (type of <i>C. macroscelis</i> ) . . . . .	22	15·0	11·0	3·85

The last three specimens are rather larger, though in measuring the tarsi of all with compasses in exactly the same way I cannot allow the last-mentioned bird 4 inches for his tarsus. The wing is rather abraded in this bird, and may measure longer in a perfect specimen.

I subjoin a description of the typical example of *Circus macroscelis*, as well as of the adult bird now in the national collection.

*Immature* (type of *C. macroscelis*). Above brown, most of the feathers with a faintly indicated paler margin, some of the interscapular feathers slightly tinged with rufous; head and neck lighter than the back, the crown slightly washed with rufous and streaked with fulvous, the hind neck streaked with white, all the bases to the feathers being of this colour; eyebrow whitish, as also the sides of the face; the ear-coverts streaked with light brown, and entirely of this colour on the hinder margin; cheeks also whitish, narrowly streaked with brown; facial ruff fulvous, all the feathers broadly centred with dark brown; throat dull whitish, slightly streaked with pale brown; rest of under surface of body fulvous, with broad rufous-brown streaks to all the breast-feathers, narrower and more indistinct on the under tail-coverts, the central streaks very narrow and linear on the thighs; under wing-coverts coloured like the breast, but the streaks darker and not so rufous, the lower series whitish at base, ashy brown at tip, resembling the inner lining of the quills, which are fulvescent at base, browner towards the tips, with indications of several ashy brown bars; upper wing-coverts brown like the back, many of them washed with rufous on their margins and having a whitish spot; primary coverts uniform brown like the quills, the primaries rather darker than the secondaries, which have a slight purplish shade, the inner primaries showing three or four dark bars, principally on the inner web; upper tail-coverts pure white, many with two and all with a single subterminal spot of rufous brown; tail-feathers light brown, the centre ones shaded with ashy, the outer ones with rufous and crossed with six bands of darker brown. Total length 22 inches, culmen 1·6, wing 15, tail 11, tarsus 3·85.

*Adult*. Above blackish, the feathers of the crown and hind neck margined with ochraceous buff or whitish, probably the remains of immaturity; the dorsal feathers with a slight greyish lustre, some of

them, however, narrowly margined with fulvous; upper tail-coverts white, banded with brown, the subterminal bars broader and shaded with greyish; tail silvery grey, whitish at tip and crossed with seven blackish bands, the subterminal ones the broadest, these bands diminishing in number on the outer feathers, where only five can be counted, the bases of the outer feathers white on the inner web; upper wing-coverts black, a few of the feathers terminally margined with whitish brown or white; edge of wing white, and the outermost of the least coverts broadly margined with silvery grey, mesially streaked with black along the shaft; median and greater series alternately barred with black and silvery grey; primary coverts similarly banded; quills black above and below, the secondaries terminally margined with white and broadly banded across with silvery grey; lores dusky blackish; eyebrow and sides of face buffy white, very narrowly lined with black; sides of neck fulvescent, streaked with black like the nape; under surface of body pure white, the fore neck slightly washed with fulvous, and, like the breast, distinctly streaked with blackish brown, these central streaks disappearing towards the abdomen and under tail-coverts, where they become mere shaft-lines; the flanks streaked with pale rufous; leg-feathers pure white, the upper part of the thigh with a few nearly obsolete rufous shaft-lines; under wing-coverts pure white, mesially streaked with black like the breast, the outermost of the lower series with a few greyish black bars; inner lining of quills black, the bases of inner webs white, mottled with blackish vermiculations, the secondaries for the most part white below, banded across with greyish black; "iris yellow." Total length 22 inches, culmen 1.45, wing 16.9, tail 11, tarsus 3.55.

#### Subfamily AQUILINÆ.

##### EUTRIORCHIS, gen. nov.

Belongs to the group of bare-legged Eagles, and is closely allied to *Spilornis* and to *Dryotriorchis*, more particularly to the last, as might have been expected. It differs principally in having a full and rounded crest, all the plumes being rounded and not lanceolate; and it is unlike any of the other Harrier-Eagles in the extreme shortness of the wing, while the tail is inordinately long and equals the wing in dimensions. Just as *Urotriorchis macrurus* is the longest-tailed form of Goshawk yet known, so *Eutriorchis* is the longest-tailed Harrier-Eagle yet discovered. From *Spilornis*, which it resembles in the fulness and form of its crest, it differs in the length of tail and in its feathered lores. The type is

##### EUTRIORCHIS ASTUR, sp. n. (Plate XIII.)

General colour above dark brown, most of the feathers of the head and back with narrow terminal margins of white to the feathers, some of the coronal plumes margined with dull rufous; crest very full and uniform with the back, the lateral plumes narrowly barred with white; most of the dorsal feathers exhibit bars of darker brown on being examined, these bars being more distinct on the upper wing-coverts, which are otherwise brown like the back; quills

brown, broadly barred with darker brown, the primaries paler on their outer margins; upper tail-coverts brown, very plainly barred across with darker brown; tail brown, tipped with white and crossed with eight blackish bands; loreal plumes and feathers over the eye white, the former with black hair-like bristles overhanging the nostrils; sides of face dull whitish, streaked minutely with brown, the hinder part of the ear-coverts entirely brown; sides of neck dark brown, barred with white; chin white, with narrow brown shaft-lines; lower throat whitish, thickly barred with brown in about equal proportions; rest of under surface pure white, regularly banded across with dark brown, the bars becoming wider on the lower flanks and under tail-coverts, the thighs more minutely barred; under wing-coverts white, transversely banded with brown like the breast, the lower series more broadly banded with blackish brown, and more resembling the inner lining of the wing, which is greyish barred with dark brown, the lower surface of the tail being similarly coloured; bill black, yellowish at base of both mandibles; feet yellow, claws black. Total length 26 inches, culmen 1·7, wing 13·5, tail 13·3, tarsus 3·6.

This new species has been discovered by Mr. Crossley in the southern portion of Madagascar. The affinities of the genus have been indicated above; and I have only to add that its general coloration resembles that of a Goshawk, and suggested the specific name to me.

*MACHÆRHAMPHUS ANDERSSONI* (Gurney); Sharpe, Cat. B. i. p. 343.

The late Mr. Lormier shot a specimen of this rare species near Tamatave, which is now in the British Museum. Another example, also from the vicinity of Tamatave, was in one of the consignments sent to Mr. Boucard, and has now passed into the collection of Professor Newton.

*FALCO CONCOLOR*, Temm.; Sharpe, Cat. B. i. p. 405.

Mr. Boucard's collector sent an adult male and a young female from the Forest of Woodoot, both killed on the 10th of March, 1874.

*CERCHNEIS NEWTONI* (Gurney); Sharpe, Cat. B. i. p. 433.

Although not sent by Mr. Crossley, the British Museum has secured a good series of this bird, collected partly by the late Mr. Lormier and partly by Mr. Boucard's correspondent, the specimens sent by the latter having been obtained in the neighbourhood of Tamatave and at Manham in January and February 1874.

*CERCHNEIS ZONIVENTRIS* (Peters); Sharpe, Cat. B. i. p. 447.

An adult specimen was sent by Mr. Boucard's collector from Marancette, North Madagascar, where it was shot in June 1874.

#### Family CORACIDÆ.

*ATELORNIS CROSSLEYI*, sp. n. (Plate XIV.)

Head rufous bay, lightest on the lores, darker on the ear-coverts,

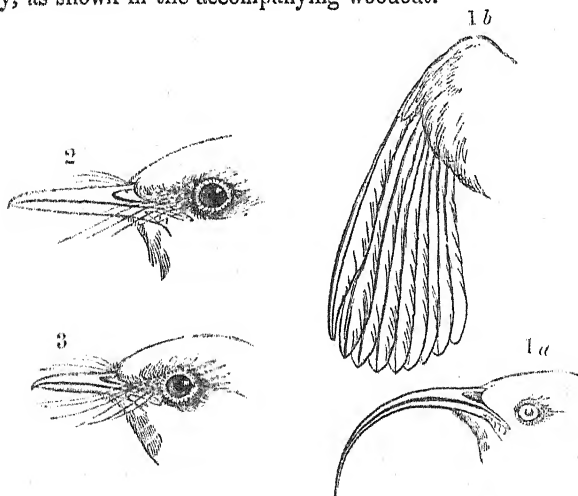
and shading off into dull greenish on the hind neck; entire back deep grass-green, as also the upper tail-coverts; the tail black, more or less washed with green, the centre tail-feathers washed with olive; the wing-coverts green like the back, the greater series inclining to cobalt-blue at their tips, the outermost ending in a conspicuous white spot; primary coverts and quills black, the latter white at the base, forming a transverse alar bar, the secondaries externally green and thus resembling the back; chin, sides of face, and fore neck bright bay, the throat with a large triangular patch of black, varied with dilated white shaft-streaks; rest of under surface dull ochraceous, paler in the centre of the body, the flanks and under tail-coverts washed with green; under wing-coverts black, washed with greenish and having two bars of white across the wing, in addition to the more distinct white band at the base of the primaries; bill and feet black. Total length 10·5 inches, culmen 1·1, wing 3·75, tail 4·5, tarsus 1·65.

The discovery of a second species of *Atelornis* is an event of great interest, particularly when it has so little resemblance to the previously known representative of the genus. The rufous head and curiously striped throat-patch of the present bird distinguish it at once from *A. pittoides*. Iris brown. Locality Ampasmonhavo.

#### FAMILY NECTARINIIDÆ.

##### NEODREPANIS, gen. nov.

Allied to *Nectarinia* and *Cinnyris*, but at once to be distinguished by its scimitar-like bill, and nearly obsolete first and sinuated second primary, as shown in the accompanying woodcut.



1 a. Bill of *Neodrepanis coruscans*. 1 b. Wing of ditto. 2. Bill of *Bernieria zosterops* ♂. 3. Bill of female of ditto.

The type is

*NEODREPANIS CORUSCANS*, sp. n.

*Not quite full-plumaged.* Entire back, upper tail-coverts, and tail metallic steel-blue, with a slight purple lustre on the rump and upper tail-coverts; head dull yellowish green, with a few steel-blue feathers appearing, showing that the crown becomes metallic like the back; wing-coverts and quills black, externally edged with yellowish green, some of the coverts becoming metallic but a little greener than the back, the innermost secondaries metallic steel-blue like the back; ear-coverts blackish; entire under surface of body yellowish, mottled with black, all the bases to the feathers being of the latter colour; under wing-coverts, sides of body, and edge of wing bright yellow. Total length 3·7 inches, culmen 1·1, wing 1·85, tail 0·9, tarsus 0·55.

It is much to be regretted that this pretty little bird is not quite in full plumage; but the colour of its metallic upper surface shows that it is not a Mascarene or African Sun-bird, with nearly every one of which I am acquainted. It is, moreover, evidently the type of an entirely new genus, and undoubtedly distinct from every Sun-bird known to me or represented in the Museum. The single example known was sent by Mr. Crossley.

#### Family TIMELIIDÆ.

*OXYLABES XANTHOPHRYS*, sp. n.

Above dull olivaceous brown, the head darker brown, all the feathers of the crown margined with dusky blackish, wing-coverts coloured like the back, the greater series clearer brown and more resembling the secondaries; quills blackish, washed with clear and somewhat rufous brown, the primaries inclining to olive-brown near the base; upper tail-coverts and tail dull reddish brown, waved with numerous cross bars of dusky brown; lores and a very broad eyebrow bright yellow, extending backwards to the sides of the neck; feathers in front of the eye blackish; ear-coverts dull brown, washed with olive like the head; under surface of body bright yellow, the sides of the neck and of the breast washed with brown, the flanks and under tail-coverts olive-brown, as also the under wing-coverts, the edge of the wing bright yellow; bill light yellowish brown, dark brown at the base of the culmen; feet pale fleshy brown. Total length 6·5 inches, culmen 0·65, wing 2·75, tail 3·1, tarsus 1·05.

A single specimen of this new bird is in Mr. Crossley's collection. It seems to me to agree well enough with *Oxylabes* to be placed in that genus, though in colour it is strikingly different from *O. madagascariensis*, the typical species.

*BERNIERIA ZOSTEROPS*, sp. n.

Above dull olive-green, more dingy on the head, a loreal stripe and a circle of feathers round the eye bright yellow; feathers between the bill and the eye black; ear-coverts dark green, with bright yellow shaft-stripes; entire under surface of body bright yellow, the sides



of the body and thighs olive-green; under wing-coverts yellowish buff, the edge of the wing bright yellow; wings and tail brown, margined with greenish olive, the inner secondaries dull olive-brown, the inner webs fulvescent on their interior margin; bill horn-brown, the lower mandible yellowish; feet light fleshy brown. Total length 6 inches, culmen 0·6, wing 2·65, tail 2·7, tarsus 0·83.

I have already (P. Z. S. 1871, p. 314) referred to M. Jules Verreaux's assurance that *Bernieria major* and *B. minor* were sexes; and of this new species I believe both sexes are represented in the present collection, as the second specimen sent measures as follows:—Total length 6·5 inches, culmen 0·8, wing 2·75, tail 2·7, tarsus 0·87.

This species is smaller than *B. madagascariensis* and is at once distinguished by its brighter colours and yellow eye-ring (whence the specific name).

The woodcut (p. 75, figs. 2 and 3) illustrates the peculiar conformation of the eye-ring in this species.

#### Family CORVIDÆ.

*EURYCEROS PREVOSTI*, Less.; Hartl. Faun. Madg. p. 59.

Mr. Crossley has sent several specimens of this unique and curious form. When in England he assured me that the bill of the living bird was pearly and exactly like the inside of an oyster-shell, fading away soon after death.

#### Family SCOLOPACIDÆ.

##### TEREKIA CINEREA.

Mr. Boucard's collector sent one specimen from the neighbourhood of Tamatave. I do not remember having seen this bird noted as an inhabitant of Madagascar.

The following notes refer to species already mentioned by me in former papers.

*ARTAMIA LEUCOCEPHALA* (Gm.); Sharpe, P. Z. S. 1871, p. 318.

Mr. Crossley has sent a most instructive series of this species, illustrating the progress from immaturity to the adult stage; and I therefore give a few remarks on these birds. *Artamia bernieri*, figured by Schlegel and Pollen, has been stated to be the young of *A. leucocephala* (cf. P. Z. S. 1871, p. 318); but if this be the case it must be the very first plumage; for the series seems perfectly continuous as represented in Mr. Crossley's collection.

*Young.* Bill yellowish white; general colour ashy grey, with a brown shade on the back: wing-coverts with slight rufous edgings; throat and chest greyish, the latter with narrow dusky cross lines; rest of under surface buff, narrowly waved with dusky grey; under wing-coverts greyish.

*More adult.* Bill a little more dusky whitish; upper surface greyish, glossed slightly with metallic greenish; under surface nearly uniform buffy white, shaded with greyish on the throat and sides of the face; only a faint trace of bars on the flanks.

*Older.* Upper surface metallic green, wings and tail included; head all round, throat, and chest ashy grey; rest of under surface white, with a few remains of dusky bars on the sides of the body; bill white on the upper mandible except the base, which is horn-blue like the lower one.

*Fully adult.* Metallic green, the entire head all round and entire under surface pure white; bill horn-blue, only the extreme tip white; on the hind neck a few greenish bars, evidently remains of immaturity.

PHEDINA MADAGASCARIENSIS, Hartl.; Sharpe, P. Z. S. 1870, p. 388.

Two more specimens of this Swallow prove that it is an entirely distinct species from the Réunion bird. It is much clearer grey above, and purer white below, with little narrow shaft-streaks on the abdomen and under tail-coverts. Mr. Crossley gives the bill and feet as black and the iris as brown.

## 6. Notes on some Mammals from Madagascar.

By DR. ALBERT GÜNTHER, V.P.Z.S.

[Received February 2, 1875.]

(Plates XV. & XVI.)

A collection of Mammals just received from Mr. Crossley, and made on his way from Tamantave to Murundava, contains several specimens adding to our knowledge of this fauna.

The young of *Lichanotus mitratus*, 12 inches long, is nearly entirely black, with a white patch in the sacral region, and with the inner side of the arm and the outer margin of the foot whitish.

An adult female specimen of *Fossa daubentonii* represents a variety in which the spots are not defined and more or less confluent. It is also slightly smaller than either of the two examples in the British Museum. A newly born individual of this species is of a light bay colour, with seven narrow continuous black stripes.

The following two species appear to be undescribed.

### CHIROGALEUS TRICHOTIS. (Plate XV.)

Brownish grey; lower parts grey, with the hairs white-tipped. A triangular spot in front of the eye black; median line of the snout and lips whitish. Hands and feet grey, with white-tipped hairs. Ears very short, hidden in the fur. The lower part of the concha and the space before the ear covered with a tuft of very long hairs. Tail rather shorter than the body, covered with short hairs, which are only slightly longer towards its extremity. The first false molar nearly as long and of the same form as the canine tooth. All the nails pointed, claw-like.

This species is allied to, and nearly of the same size as, *Ch.*

February 16, 1875.

George Busk, Esq., F.R.S., V.P., in the Chair.

The Secretary read the following report on the additions to the Society's Menagerie during the month of January 1875.

The total number of registered additions to the Society's Menagerie during the month of January was 75, of which 34 were by presentation, 33 by purchase, 1 by exchange, 2 by birth, and 5 were received on deposit. The total number of departures during the same period, by death and removals, was 74.

The most noticeable additions during the month of January were as follows:—

1. A Silver-backed Jackal (*Canis chama*, Smith), presented by Mr. H. B. N. Good on the 6th of January. Mr. Good informs me that he obtained the animal at the diamond-fields in Griqualand West, from a Dutch Boer, in November 1874. It had been caught near the Boer's farm some time previously; and Mr. Good has seen others of the same species in the same district.

This species of *Canis* appears to be very little known. It was described in 1835 by Sir Andrew Smith (South-African Quart. Journ. ii. p. 89\*).

I have never seen a living example of this species before, and am only acquainted with the specimen in the British Museum, which is one of the types received from Sir A. Smith. It is remarkable for its large pointed ears, resembling those of the Fennec (*Canis cerdo*) and Syrian Fennec (*Canis famelicus*), of which we have also living specimens in the Gardens. It is also in other respects a strongly marked and very distinct species, as will be seen by the drawing (Plate XVII.) of the present specimen, made by Mr. Smit.

\* This work is so very scarce that I think it may be useful to reprint the original description.

"*Canis chama*, Smith (The Asse). Muzzle, centre of face, and top of head yellowish brown, variegated by an intermixture of bristly hairs annulated black and white; sides of head a uniform whitish yellow; upper lip, towards angles of mouth, lower lip, and chin blackish brown; whiskers and edges of eyelids black; ears large, outer surfaces yellowish red, inner margined with white hairs, elsewhere bare. Woolly hairs of neck and body abundant, their tips reddish white or yellowish white, elsewhere a dull smoke-colour; bristly hairs abundant on back of neck and centre of back, on sides, shoulders, and outsides of thighs less numerous, all annulated black and white, the tips black. Extremities yellowish white, inclined to white on their anterior surfaces; a large brownish-black blotch on the posterior surface of each hinder extremity, about halfway between the feet and base of tail. Underparts of neck and body whitish yellow. Tail very bushy, the prevailing colour yellowish white, the upper surface towards base variegated with bristly hairs annulated black and white; the black, about three inches from the root, is so disposed as to give an appearance of one or two waved transverse black stripes; from thence to the point the bristly hairs are all tipped with black, and at the very extremity of the tail they are almost entirely of that colour, so that it appears perfectly black. Length, from nose to base of tail, 23 inches; length of tail 13 inches; height at shoulder 12 inches, at rump 13 inches.

Inhabits Namaqualand and the country on both sides of the Orange river.

Dr. Gray (who miswrites the specific name of this animal "*cauma*"\*) has given a figure of its skull.

2. A Banded Cotinga (*Cotinga cincta*) from Bahia, purchased January 18, being, so far as I know, the first example of any species of this magnificent group of birds that has reached Europe alive.

3. An Australian Cassowary (*Casuarus australis*) from northern Queensland, presented by the Marquess of Normanby, F.Z.S., Governor of New Zealand, 23rd January, being the specimen previously announced as having been sent off by Lord Normanby before quitting his former government of Queensland (see above, p. 2).

Mr. Selater exhibited a drawing of a supposed new Rhinoceros from the Terai of Bhootan, which had been forwarded to him from Calcutta by Mr. William Jamrach, and read extracts from a letter addressed to him by Mr. Jamrach on the subject. Mr. Jamrach, at the date of his letter (Jan. 16th), was leaving for England with the animal alive.

Mr. Selater exhibited a living specimen of the Peguan Tree-shrew (*Tupaia peguana*), which had been presented to the Society by the Hon. Ashley Eden, Chief Commissioner at Rangoon, British Burmah, and had reached the Gardens on the 8th inst., being, as it was believed, the first specimen of a living *Tupaia* of any species that had reached Europe. In the same cage was a small Squirrel (*Sciurus blanfordi*) of nearly the same size and colour. The general external resemblance between these two animals, structurally so widely diverse, was very remarkable, and almost amounted to mimicry.

The following papers were read:—

1. On a point in the Mechanism of the Bird's Wing. By A. H. GARROD, B.A., F.Z.S., Fellow of St. John's College, Cambridge, Prosector to the Society.

[Received January 25, 1875.]

The beautiful investigations of Borelli, together with those of M. Marey, make it certain that in any organ which is employed as a flapping wing there must be a stiff or rigid anterior margin. In the insect the stout anterior nervure performs this function; in the bird the bones of the arm, forearm, and manus do the same. Now, in the latter, this necessary rigidity is developed, considering the presence of the elbow- and wrist-joints, must be, at first sight, a matter of surprise. It depends on a mechanical arrangement by which, when, in the wing, the arm is bent on the forearm, the manus is always similarly bent on the forearm; and when extension of the forearm is made, extension of the manus equally certainly follows. This occurs when all the muscles and tendons are removed, and the ligaments binding the bones together are alone left.

\* "*Fennecus cauma*," P. Z. S. 1868, p. 520, et Cat. Carn. Mamm. p. 207.

The explanation of this mechanism is not difficult. The arm consists of one bone only, the humerus; the forearm of two, the ulna and radius; the manus of the two carpals together with the metacarpals and phalanges. The mutual relations of these two bones are such that the radius and ulna move one above the other like the two limbs of a pair of drawing-parallels, each being fixed proximally to the humerus and distally to the carpus. The plane common to the radius and ulna is the same as that in which flexion and extension of the elbow is performed, so that one of the two bones of the forearm, the radius, articulates with the humerus at a point nearer the shoulder, or further from the elbow, than its companion, the ulna. At the wrist the radius is consequently superior, articulating with the carpal bone on the pollex side; whilst the ulna articulates with the other element of the carpus. This condition maintaining the parallel movements of the radius on the ulna must necessarily be attended by a parallel movement of the humerus on the manus. When the humerus bends upon the ulna, the manus therefore similarly bends upon the forearm; and the triceps muscle is able, unassisted, to maintain the whole limb in a rigid state during extension.

In making a wooden model of these bones to illustrate the above described mechanism, one or two points of mechanical detail suggested a reference to the shape of the distal end of the humerus. The wing in the living bird, when at rest, is completely folded; and when fully extended forms but a slightly angular rod. To allow of this considerable range of movement of the bones of the forearm on the humerus, and of their being completely folded up, it is necessary to attach a very projecting hinge at the portion of the model of the humerus which represents the humero-ulnar articulation, otherwise, when fully flexed, the model radius would not be able to be included between the then parallel humerus and ulna; especially as the radius, to get in its fully flexed position, must rotate on a hinge which itself projects its semidiameter at least beyond the humerus.

These requirements explain the characteristic shape of the distal end of the humerus in birds. It is curved towards its flexor side, and sharply so at its extremity where it comes in contact with the ulna. At the same time the radius articulates with it on a well-developed knob, situated above the similar surface for the ulna, and to its outer side (which allows of a less extensive joint). The similar arrangement required at the wrist-joint is arrived at by the interpolation of the carpal bones between the forearm and consolidated metacarpus.

In some wings, when all the muscles are removed, this movement is not so manifest as in others, there being a certain amount of independent power of movement in the manus in all positions. This is much reduced in the living bird by the tendon of the *tensor patagii longus* muscle, which runs from the shoulder, along the free margin of the patagium, to the wrist, where, in being attached to the metacarpal mass on the pollex side, it aids the extension of the manus during the extension of the forearm.

The mechanism above described is stated by Dr. Alix\* to have been first indicated by Bergmann, as far as the anatomical arrangement is concerned, although Strauss-Dürckheim, in his 'Théologie de la Nature,' was the first to explain it fully. Dr. Alix himself has also† entered into the detail of the movement "of elongation" of the radius, which is well explained in his large work above referred to‡. My object in bringing the subject before the Society is to draw special attention to so important a point, and to illustrate its action by a wooden model, which demonstrates its accuracy in a very striking manner.

It may be here mentioned that the movement of the general plane of the wing during both the up and down stroke, which by Borelli and his followers is ascribed to the elastic yielding of the feathers in birds, and of the wing-membrane in insects, appears to me rather to be dependent on the torsion of the bones or main nervure of the wing, the power of lateral flexion in which is proved by M. Marey's discovery of the figure-of-8 action in the insect. A thin wooden lath employed as a nervure to an artificial wing, if set with its narrow section vertical and fixed to a non-yielding horizontal wing, gives a vertical figure-of-8 when moved up and down, the plane changing exactly as it is described by M. Marey in the insect.

2. Further Remarks on the Cassowaries living in the Society's Gardens, and on other Species of the Genus *Casuarus*.  
By P. L. SCLATER, M.A., Ph.D., F.R.S., Secretary to the Society.

[Received January 29, 1875.]

(Plates XVIII.—XX.)

The recent additions to our series of Cassowaries are of great interest, and seem to necessitate some further remarks upon a subject to which I have more than once directed the Society's attention.

On the 27th of May last year, we purchased of Mr. Broughton of the 'Paramatta,' who seldom returns from Sydney without bringing some welcome addition to our collection, a not quite adult Cassowary, which, as I am informed, had been brought to Sydney in the month of April, 1873, by Mr. Godfrey Goodman, Medical Officer of H.M.S. 'Basilisk,' and had lived some eight or nine months in the Botanic Gardens there§. This Cassowary was entered in the register as a Mooruk; and not being at the time aware of its history, I did not pay special attention to it. Later in the summer, having become aware of its

\* 'Essai sur l'appareil locomoteur des Oiseaux,' Paris, 1874, p. 230.

† Bulletin de la Société Philomathique, 1864.

‡ Loc. cit. p. 330 et seq.

§ In a letter just received from Dr. G. Bennett he informs me that he has ascertained from Mr. Goodman that this bird was obtained when quite young from the natives at Discovery Bay, in Milne Bay, on the S.E. coast of New Guinea. Several other specimens of the same bird were subsequently brought on board and purchased.

few words to add about a species which we have not yet received, and which appears to be also hitherto unrecognized.

When at Genoa last year the Marquis Doria called my attention to a stuffed Cassowary in the Museo Civico, which had been obtained by Dr. E. Beccari in Wokan, the most northern of the Aroo Islands\*. By my friend's kindness I am now able to exhibit coloured sketches of this bird and also of its head and neck (see figures 1 and 2, p. 86). By these it will be seen at once that this species belongs to the section which contains *C. galeatus*, but from the highly elevated crest (see fig. 1) would seem to be more nearly allied to *C. australis*. The neck-wattles, however, are decidedly of a different structure, there being, in fact, only one broad central wattle, which is slightly divided at its termination (see fig. 2). Now the only Cassowary yet known to us from the Aroo Islands is *C. bicarunculatus*†—a very different species. I cannot, therefore, doubt that we have here again to deal with a new species of the genus, which I propose, with the Marquis Doria's sanction, to designate after its discoverer,

*CASUARIUS BECCARII*, sp. nov.

*C. similis C. australi et crista pari modo elevata: sed caruncula cervicis una media, ad apicem divisa.*

*Hab.* Wokan, inss. Aroensium (Beccari).

*Mus. civit.* Genoensis.

The colours of the naked parts of the head and neck, as given in a drawing which M. Doria informs me has been copied from a specimen in spirits in good preservation, would appear to show that in this respect also *C. beccarii* comes nearest to *C. australis*‡.

To conclude, I exhibit a revised table which summarizes our present knowledge of the Cassowaries and their distribution.

#### *Index specierum Generis Casuarii.*

a. Casside lateraliter compressa; appendicula cervicis aut duplici aut divisa.

1. *C. galeatus*, ex ins. Ceram.
2. *C. beccarii*, ex ins. Aroensi Wokan.
3. *C. australis*, ex Australia bor.
4. *C. bicarunculatus*, ex inss. Aroensibus.

b. Casside transversim compressa; appendicula cervicis unica.

5. *C. uniappendiculatus*, ex Papua.

c. Casside transversim compressa; appendicula cervicis nulla.

6. *C. papuanus*, ex Papua boreali.
7. *C. westermanni*, ex ins. Papuana Jobie (?).
8. *C. picticollis*, ex Papua meridionali.
9. *C. bennetti*, ex Nov. Britann.

\* See Mr. Wallace's Map, Travels in E. I. Arch. ii. p. 219.

† Figured P. Z. S. 1872, pl. xxvi. This specimen (the only adult example known) is now in the Cambridge University Museum, to which it was presented by Lord Walden.

‡ See large figure of the head of this species in Gould's B. Austr. Suppl. pl. 70.

The mechanism above described is stated by Dr. Alix\* to have been first indicated by Bergmann, as far as the anatomical arrangement is concerned, although Strauss-Dürckheim, in his 'Théologie de la Nature,' was the first to explain it fully. Dr. Alix himself has also† entered into the detail of the movement "of elongation" of the radius, which is well explained in his large work above referred to‡. My object in bringing the subject before the Society is to draw special attention to so important a point, and to illustrate its action by a wooden model, which demonstrates its accuracy in a very striking manner.

It may be here mentioned that the movement of the general plane of the wing during both the up and down stroke, which by Borelli and his followers is ascribed to the elastic yielding of the feathers in birds, and of the wing-membrane in insects, appears to me rather to be dependent on the torsion of the bones or main nervure of the wing, the power of lateral flexion in which is proved by M. Marey's discovery of the figure-of-8 action in the insect. A thin wooden lath employed as a nervure to an artificial wing, if set with its narrow section vertical and fixed to a non-yielding horizontal wing, gives a vertical figure-of-8 when moved up and down, the plane changing exactly as it is described by M. Marey in the insect.

## 2. Further Remarks on the Cassowaries living in the Society's Gardens, and on other Species of the Genus *Casuarus*. By P. L. SCLATER, M.A., Ph.D., F.R.S., Secretary to the Society.

[Received January 29, 1875.]

(Plates XVIII.-XX.)

The recent additions to our series of Cassowaries are of great interest, and seem to necessitate some further remarks upon a subject to which I have more than once directed the Society's attention.

On the 27th of May last year, we purchased of Mr. Broughton of the 'Paramatta,' who seldom returns from Sydney without bringing some welcome addition to our collection, a not quite adult Cassowary, which, as I am informed, had been brought to Sydney in the month of April, 1873, by Mr. Godfrey Goodman, Medical Officer of H.M.S. 'Basilisk,' and had lived some eight or nine months in the Botanic Gardens there§. This Cassowary was entered in the register as a Mooruk; and not being at the time aware of its history, I did not pay special attention to it. Later in the summer, having become aware of its

\* 'Essai sur l'appareil locomoteur des Oiseaux,' Paris, 1874, p. 230.

† Bulletin de la Société Philomathique, 1864.

‡ Loc. cit. p. 330 et seq.

§ In a letter just received from Dr. G. Bennett he informs me that he has ascertained from Mr. Goodman that this bird was obtained when quite young from the natives at Discovery Bay, in Milne Bay, on the S.E. coast of New Guinea. Several other specimens of the same bird were subsequently brought on board and purchased.



few words to add about a species which we have not yet received, and which appears to be also hitherto unrecognized.

When at Genoa last year the Marquis Doria called my attention to a stuffed Cassowary in the Museo Civico, which had been obtained by Dr. E. Beccari in Wokan, the most northern of the Aroo Islands\*. By my friend's kindness I am now able to exhibit coloured sketches of this bird and also of its head and neck (see figures 1 and 2, p. 86). By these it will be seen at once that this species belongs to the section which contains *C. galeatus*, but from the highly elevated crest (see fig. 1) would seem to be more nearly allied to *C. australis*. The neck-wattles, however, are decidedly of a different structure, there being, in fact, only one broad central wattle, which is slightly divided at its termination (see fig. 2). Now the only Cassowary yet known to us from the Aroo Islands is *C. bicarunculatus*†—a very different species. I cannot, therefore, doubt that we have here again to deal with a new species of the genus, which I propose, with the Marquis Doria's sanction, to designate after its discoverer,

*CASUARIUS BECCARII*, sp. nov.

*C. similis C. australi et crista pari modo elevata: sed caruncula cervicis una media, ad apicem divisa.*

*Hab.* Wokan, inss. Aroensium (*Beccari*).

*Mus. civit.* Genoensis.

The colours of the naked parts of the head and neck, as given in a drawing which M. Doria informs me has been copied from a specimen in spirits in good preservation, would appear to show that in this respect also *C. beccarii* comes nearest to *C. australis*‡.

To conclude, I exhibit a revised table which summarizes our present knowledge of the Cassowaries and their distribution.

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† Figured P. Z. S. 1872, pl. xxvi. This specimen (the only adult example known) is now in the Cambridge University Museum, to which it was presented by Lord Walden.

‡ See large figure of the head of this species in Gould's B. Austr. Suppl. pl. 70.

3. Note on a new Locality of *Dinornithidæ*.

By Prof. OWEN, C.B., F.R.S., F.Z.S.

[Received February 1, 1875.]

I have been favoured by an esteemed correspondent, Dr. Coughtry, with the following notice of a discovery in, to me, a new locality, in the province of Otago, New Zealand, of remains of *Dinornithidæ*. He writes :—" It might, perhaps, interest you to know that we got in the Hamilton Swamp remnants of the following species :—

" <i>Dinornis maximus</i> .	<i>Dinornis didiformis</i> .
— <i>robustus</i> .	— <i>casuarinus</i> .
— <i>ingens</i> .	— <i>crassus</i> , 2 varieties.
— <i>struthioides</i> .	— <i>elephantopus</i> , 2 vars.
— <i>rheides</i> .	— <i>gravis</i> .

"Of all the above species we have duplicate leg-bones. Besides, we have almost complete skeletons of '*Cnemidornis culcitrans*.'"

It is satisfactory to find that the authorities in charge of the rapidly rising museum of Otago appear to have no difficulty in distinguishing the remains of *Dinornis gravis* from the varieties referable to *Dinornis crassus*, my chief difficulty and, for some time, doubt having been in relation to the limb-bone characters of the former species. Its cranial characters, however, were decisive; and as the number of skulls of *Dinornithidæ* now on hand corresponds with the species, or established varieties, of *Dinornis*, based on characters of the previously found leg-bones, and as the descriptions and figures of these bones in the 'Transactions of the Zoological Society' evidently serve their purpose in aid of the recognition of parts of the skeleton by their discoveries in new localities of New Zealand, one aim of the series of "Memoirs" which the Society has favoured me by publishing has been attained.

4. On *Anomalurus*, its Structure and Position.

By EDWARD R. ALSTON, F.Z.S.

[Received February 1, 1875.]

(Plate XXI.)

This genus was established by Mr. Waterhouse in 1842\*, and now contains four or five species, all natives of Tropical Western Africa. In external appearance the Anomalures very closely resemble the larger Flying Squirrels (*Pteromys*)—their most striking outward distinctions being the double series of large salient scales on the lower surface of the first third of the tail, and the fact that the cartilage which serves to extend the flying expansion has its origin at the elbow instead of at the wrist. They are also described as

\* P. Z. S. 1842, p. 124.

having similar habits, climbing lofty trees, and passing by a great sailing bound from the summit to another stem; in ascending a tree the caudal scales are pressed against the trunk and thus serve as "climbing-irons." But Mr. Waterhouse pointed out, in his original description, that the genus differs not only from the Flying Squirrels, but from all the other *Sciuridæ*, in many important characters of the skull and dentition—notably in the large size of the infraorbital opening, the almost entire absence of postorbital processes, the contraction and emargination of the bony palate, and the number and appearance of the grinding-teeth.

Since its discovery, zoologists have held very various views as to the true affinities of the Anomalure. Mr. Waterhouse regarded it as an aberrant Squirrel, showing an approach to the Dormice\*. Dr. Gray took the same view, placing it at the head of the *Sciurina*, immediately following the *Myoxina*†. Temminck treated *Anomalurus* as a subgenus of *Pteromys*, and first gave some account of the skeleton‡, which was more fully described by Gervais§, and figured in the posthumous part of De Blainville's 'Ostéographie'¶. According to the views which M. Gervais then held, the subfamily *Anomalurina* had no real relationship to the Squirrels, but should be ranked among the *Hystrioidæ*, next to *Cupromyna*—an arrangement to which Giebel¶¶ and Burmeister\*\* gave their adherence. Brandt first placed the Anomalures as the third tribe of his family *Sciuroides*, under the name of *Anomaluri* seu *Pteromyoxosciuri*, as indicating their relationship††, but subsequently proposed another classification, in which they formed the first subfamily, named *Anomalurini* seu *Sciuri Lemuriformes*, as showing an approach to the Lemurs, through *Galeopithecus*, in the structure of their toes and claws‡‡. M. Gervais has since withdrawn from his first position as to the hystrioid affinities of the animal, but, still holding that it is not a Squirrel, unites it with the Dormice and the miocene genera *Theridomys* and *Archæomys* in his "famille des Myoxidés"§§. In this he has been followed by Dr. Fitzinger|||. Prof. Lilljeborg placed *Anomalurina* as a subfamily of *Sciuridæ* showing an approach to the Hystriomorpha of Brandt¶¶¶; and more recently he retains this arrangement, but suggests that the form should probably rank as a distinct family\*\*\*. This last view is shared by Dr. Gill, who makes the *Anomaluridæ* a family equal in value to the *Sciuridæ*, and places it between the latter and the *Haploodontidæ*†††.

\* Ann. & Mag. Nat. Hist. x. p. 202 (1842).

† List Mamm. Brit. Mus. p. 133 (1843).

‡ Esquisses Zoologiques, pp. 143-146 (1853).

§ Ann. Scien. Nat. (3<sup>e</sup> sér.) xx. pp. 238-246, pl. xiii. (1853).

¶ Atlas, iv. *Sciurus*, pl. i. (1855).

¶¶ Thiere Brasilien, Th. i. p. 341 (1854).

\*\* Thiere Brasilien, Th. i. p. 341 (1854).

†† Mém. de l'Ac. St. Pétersb. (6<sup>e</sup> sér.), Sc. Nat. vii. pp. 298, 299 (1855).

‡‡ Compt. Rend. Ac. Scien. xliii. pp. 139-143 (1856).

§§ Zoologie et Paléontologie Françaises (2<sup>e</sup> éd.) pp. 27-30 (1859).

¶¶ Sitzungsab. Ak. Wissensch. Wien, lv. (erste Abth.) p. 511 (1867).

¶¶¶ Syst. Öflv. de Gnagande Däggdjuren, pp. 38, 40 (1866).

\*\*\* Sveriges och Norges Rygggradsdjur, i. p. 383 (1874).

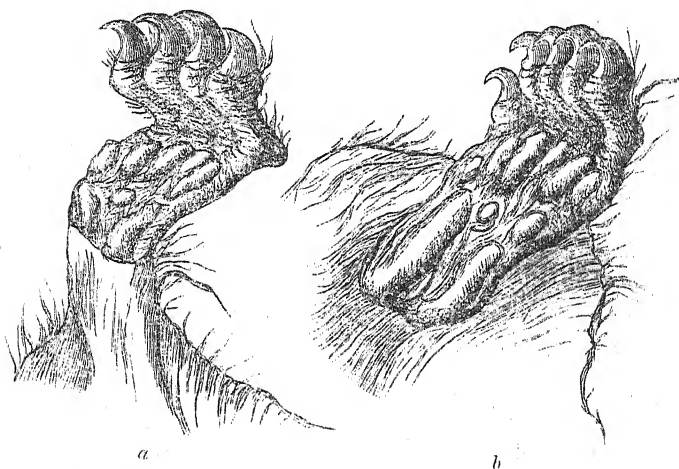
††† Smithsonian Miscellaneous Collections, xi. p. 21 (1874).

Through the kindness of Professor Flower and Dr. Günther, I have been enabled to examine specimens of two species of *Anomalure* preserved in spirits in the Museum of the Royal College of Surgeons and the British Museum, and have hence been led to reconsider the question of the nature and affinities of the animal. I have to acknowledge the kind help of my friend Mr. Garrod in the examination and comparison of the very remarkable viscera, which do not appear to have been previously described.

#### STRUCTURE.

*External characters.*—With regard to these little can be added to Mr. Waterhouse's excellent original description. On examining specimens in spirits, however, one peculiarity is observed which is less striking in dry skins. This is the arrangement and form of the tubercles on the naked soles of the feet. The fore feet have a series of *five* tubercles at the base of the toes (in *A. pelii* the second inner tubercle is nearly divided in two); behind these there is a small round isolated one in the centre of the sole, and on each side a

Fig. 1.



*a.* Fore foot, *b.* Hind foot, of *Anomalurus fraseri*, natural size.

larger callosity. In the hind feet there is a series of *six* at the base of the toes, with a small central, one long internal, and two external tubercles. This remarkable arrangement, which is very similar in all the species, is well shown in the figure. The number of scales in the caudal series varies slightly in different individuals. As already noticed, the cartilage, or chondrified fascia, which supports the flying expansion or *patagium*, is attached to the olecranon instead

of to the carpus, although the membrane itself springs from the side of the wrist\*. Thus instead of extending along the free front margin of the patagium as in *Pteromys* and *Sciuropterus*, it passes diagonally between its folds to the anterior corner. In the one arrangement the cartilage may be compared to the yard of a lug-sail, in the second to the gaff of a sprit-sail.

*Skeleton.*—The skeleton of Pel's Anomalure having been described and figured by Gervais and De Blainville, it will be sufficient to remark on the points which bear more especially on the affinities of the animal.

The skulls of *A. fraseri*, *A. pelii*, and *A. beecrofti* are very much alike, though the examination of a series of each would probably show constant specific characters. On comparing the skull of *A. pelii* with that of *Pteromys nitidus*, the differences already alluded to are very striking. The postorbital processes of the frontals are rudimentary and almost obsolete in the Anomalure, while they are largely developed in the Flying Squirrel; on this point, however, too much weight should not be laid; for in the African Ground-Squirrels (*Xerus*) and the Chipmunks (*Tamias*) these processes are comparatively small. The other distinctions are all connected with the function of mastication. The infraorbital foramen is expanded into a large suboval opening in the anterior root of the zygoma, and evidently gives passage to a portion of the masseter muscle, as well as to the infraorbital branch of the fifth pair of nerves, instead of transmitting the nerve only as in *Pteromys* and the other *Sciuridæ*. The glenoid cavity is narrower, the articular surface of the condyle of the mandible is more sloped outwards; and the bony palate is much contracted, convex, and deeply emarginate behind.

In all other essential characters the skulls appear to me to agree. The nasals are narrower in the Anomalure (as they also are in *Xerus*), but of the same general form. The frontals are not more contracted (if the postorbital processes be disregarded), and have the same median depression. The direction of the temporal ridges is the same, as are the position of the foramina of the base of the skull, and the size of the incisive foramina. The structure of the auditory bullæ is identical, their interiors being partially divided into cells by imperfect bony septa, radiating from the walls towards the cochlea: the external meatus is large in both; but in the Anomalure its margin is less produced†. The form and proportions of the mandible are the same in both animals.

The other parts of the skeleton of the Anomalure differ in no important point from that of the Flying Squirrel, except the number of ribs, of which there are sixteen pairs instead of twelve, and the flattening and breadth of the olecranon, to give attachment to the cartilage of the flying expansion. The vertebræ of *A. pelii* are:—

\* Temminck was therefore mistaken in stating that the forearm is free in the Anomalure (Esquiss. Zool. p. 145).

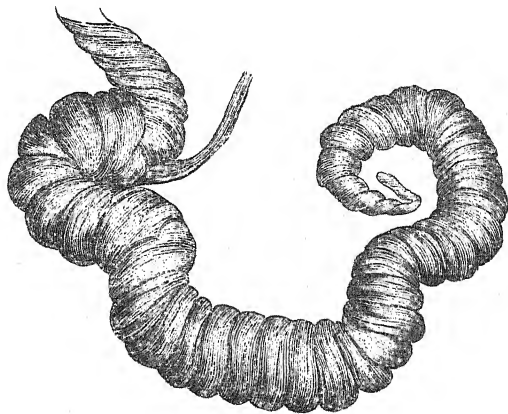
† Since the above was written, my friend Mr. A. Doran has called my attention to the auditory ossicles of *Anomalurus*, which are identical in type with those of the true Squirrels.

cervical 7, dorsal 16, lumbar 9, sacral 4, caudal 28; the latter are much elongated. The posterior ridge of the scapula is very salient; and the humerus has a moderate deltoid ridge. The femur has a crest representing the third trochanter; and the slender fibula is quite distinct from the tibia; in *Pteromys* these bones are often closely united below, though not truly fused.

*Dentition*.—The grinding-teeth of the Anomalure are four in number on each side above and below, the small anterior premlar of *Pteromys* being absent; this tooth, however, is lost early in life in many species of Squirrel. Their series converge in front; and they are placed obliquely; so that the crowns of the upper teeth look outwards, and those of the lower jaw inwards. These crowns are worn perfectly flat even in young individuals, exposing islands of cement separated by cross folds of enamel, which are more directly transverse and less twisted than in the more complicated teeth of *Pteromys*. In the typical skull of *A. beecrofti*, in the British Museum, the cemental spaces are smaller and more isolated than in the other species.

*Viscera*.—These, like the masticatory apparatus, differ much from those of the *Sciuridæ*, and, indeed, present peculiarities not met with in any other family of the order.

Fig. 2.



Cæcum of *A. fraseri*, natural size.

The tongue resembles that of the Squirrels, but is narrower and more pointed. The circumvallate papillæ are two in number, and are placed transversely.

The œsophagus has a short abdominal course after passing through the diaphragm, extending in *A. fraseri* to about half an inch; its epithelium is not continued beyond the cardiac orifice.

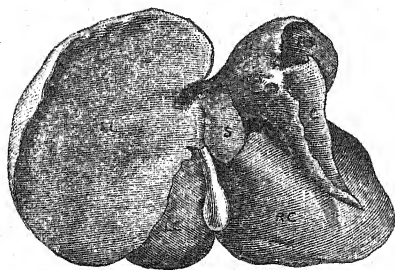
The stomach is perfectly simple and nearly oval, the cardiac and pyloric openings being near one another. The walls are very thin; and the epithelial lining is smooth and perfectly uniform throughout. A very small external fold or pucker runs transversely across the lesser curvature. In *A. fraseri* the greatest diameter is 1·75 inch, the lesser about ·80.

The duodenum has the usual dilatation below the pylorus; the length of the small intestine in *A. fraseri* is 43·50 inches, and in *A. pelii* 60 inches.

The cæcum is of considerable volume. In *A. fraseri* its length is about 5 inches, and its greatest diameter ·50; in the specimen examined of *A. pelii* its proportions were similar, but it was too greatly injured by shot to allow of exact measurement. In form and structure it is very different from that of the Squirrels, and, indeed, from that of any of the *Glires Simplicidentati* with which I am acquainted. It is at first continuous with the colon, irregularly coiled on itself, and sacculated almost to its end by an internal spiral fold, with a free inner edge, as in the Hares; this fold is nearly regular and continuous, but here and there it is interrupted. The extremity is very narrow, perfectly simple, and abruptly reflected on itself. In the figure the cæcum is shown uncoiled and extended, in which condition its structure is more plainly shown than when it is in its natural convolutions.

The colon is at first marked by the inner fold continued from the cæcum; its first loop after leaving the latter is longer than the second. The length of the large intestine from cæcum to anus is in *A. fraseri* about 16 inches, in *A. pelii* 47 inches, making the whole length of the intestine about 60 inches in the former and 107 inches in the latter, or rather more than *five* times the length of the head and body in each case.

Fig. 3.



Liver of *A. fraseri*, natural size.

LL, left lateral lobe; LC, left central; RL, right lateral; RC, right central; S, Spigelian; c, caudate lobe.

The spleen is of the same shape as in the Squirrels.

The liver has the general proportions shown in the figure. The caudate lobe is long and pointed; it is proportionally smaller in *A. pelii* than in *A. fraseri*. The Spigelian lobe is small and simple, not double or bifid as in almost all known rodents. There is no trace of a cystic notch; and the gall-bladder lies directly over the umbilical fissure—an arrangement which has never been observed, as far as I know, in any other member of the order.

The uterus of the female is long and double. In the male the penis is stated by Gervais to be provided with a bone.

#### SYSTEMATIC POSITION.

From the above facts it appears to be clear that the *Anomalure* is an aberrant Squirrel, with no special affinities to any other family, that its peculiarities are all purely adaptive, and that they are all in direct connexion with the functions of mastication and digestion.

Thus, in the skull, if we pass the minor point of the reduction of the postorbital processes, we find that it is built on the true sciurine type, *except* in those parts which are modified by the peculiarities of the masseter muscle and teeth. Mr. Waterhouse, with his usual acumen, remarked in his original description:—"The masticating surfaces of these teeth are worn flat by usage, even in the comparatively young animal, as in other rodents which have a large ant-orbital opening, and have not a tubercular surface such as we find in the molars of the typical Squirrels. These last-mentioned animals, it would appear, have a rotatory motion of the lower jaw, while the *Anomaluri* have a longitudinal, no doubt combined with the rotatory motion; and this difference is perhaps due to the action of that portion of the masseter muscle which passes through the antorbital opening" (*l. c.* p. 127)\*. The rest of the skeleton, save in the number of ribs, seems also to be that of a true Squirrel; and though the viscera are widely different from those of that group, yet they are also unlike the organs of any other family.

The resemblances which have been pointed out to the Dormice and to the hystricine rodents appear to me to be merely superficial and adaptive. Those to the *Myoxidae* are only in the size (not the form) of the infraorbital opening, and the number and general appearance of the grinding-teeth, and do not extend to any more important characters. The points of similarity to some of the *Hystricidae*, in the form of the infraorbital opening, the shape of the bony palate, and the number of ribs, are much more striking, but are at once negatived by the structure of other parts, notably by that of the mandible, zygoma, auditory bullæ, and base of the skull. The teeth, which M. Gervais compares to those of *Cercomys*, have not so great a resemblance to the teeth of any of the *Hystricidae* as the dentition of the Beaver has to that of the widely distinct *Coypu*. Brandt's comparison of *Anomalurus* to

\* Cf. Von Teutleben, Archiv f. Naturgeschichte, 1874, pp. 91-93.



*Galeopithecus*, founded on the compression of the toes and claws, seems too fanciful to require discussion, though by a curious coincidence the cæca of the two animals are somewhat similar in appearance.

What may have been the causes of the wonderful modification of the alimentary system and the subsidiary parts of the skull in *Anomalurus* is more doubtful. The facts seem to point to the effect of a more dry and innutritious diet. Beyond Temminck's statement that "ils se nourrissent de fruits," nothing has been recorded of the food of the *Anomalures*; and the contents of the stomachs of the specimens I have examined were unfortunately too well digested to yield much information. That of *A. pelii*, however, contained a quantity of long vegetable fibres, which seems not unfavourable to the idea that they may live principally either on dry and stringy fruit or on leaves.

A further question, and one perhaps incapable of a satisfactory solution, remains. Is *Anomalurus* more closely allied to *Pteromys* and *Sciuropterus* than to the non-volant genera of the family? or are their resemblances an instance of the independent origin of similar structures? The development of a flying-expansion in itself naturally points to the former view, while the remarkable difference in the attachment and course of its expanding cartilage seems to be in favour of the latter.

The geographical distribution of the two groups is worthy of note. As far as we know at present, the *Anomalures* appear to be confined to a limited region of West Africa, extending from the equator to about 15° north latitude, whereas no species either of *Pteromys* or *Sciuropterus* seems ever to have been met with in any part of the Æthiopian region.

If the above views are correct the systematic position of the *Anomalures* is settled, and their rank will merely depend on the higher or lower value given to the whole sciurine group of rodents. If the latter is regarded as a family, then the *Anomalurinae* will be a subfamily of *Sciuridae*; if as a separate section of the order, the *Anomaluridae* will form one of the constituent families of the *Sciuromorpha*. In either case the characters will be the same as those proposed by Mr. Waterhouse for the only known genus.

I now conclude with the synonymy, characters, and habitats of the known species of the genus.

#### SPECIES.

##### 1. ANOMALURUS FRASERI.

1842. *Anomalurus fraseri*, Waterhouse, P. Z. S. 1842, p. 124; Ann. & Mag. Nat. Hist. x. p. 201.

1842. *Pteromys derbianus*, Gray, Ann. & Mag. Nat. Hist. x. p. 262.

1843. *Anomulurus derbianus*, Gray, List Mam. Brit. Mus. p. 133.

1860. *Anomalurus beldeni*, Du Chaillu, Proc. Boston Soc. Nat. Hist. vii. p. 303\*.

Above grizzled sooty brown, extremities darker, area round ears blackish. Below dirty white, chin and throat dark grey. Measurements of a small specimen in the flesh:—head and body 11 in., tail 11·50, ear 1·30, fore foot (without claw) 1·40, hind foot 2.

*Hab.* Fernando Po (*Fraser, Brit. Mus.*); Gambia? (*Brit. Mus.*); Ashantee (*Mus. R. Coll. Surg.*).

## 2. ANOMALURUS PELII.

1845. *Anomalurus pelii*, Temminck, Verhand. over de Nat. Geschied. der Nederl. Bezitt. i. (d. ii.) p. 108; Esquisses Zool. (1853), p. 146.

Above sooty black; the broad margin of the flying-expansion, nose, long hairs at base of ears, tail, and lower parts white; feet white, mixed with dusky. Measurements of a specimen in the flesh:—head and body 17 in., tail 17·75, ear 1·75, fore foot 1·60, hind foot 2·50.

*Hab.* Fantee, Ashantee (*Pel, Leyden Mus.*; *Brit. Mus.*).

## 3. ANOMALURUS BEECROFTI.

1852. *Anomalurus beecrofti*, Fraser, P. Z. S. 1852, p. 17, pl. xxxii.

Above grizzled yellowish grey, washed along the spine with rufous; front part of flying-expansion dusky; a short pale band on each side of the neck, and a small white spot between the ears; tail dusky brown. Below bright rufous. Measurements of a dry skin:—head and body 15 in., tail 9.

*Hab.* Ashantee (*Fraser, Brit. Mus.*); Cameroon Mountains, 7000 feet above sea (*Burton, Brit. Mus.*)†.

## 4. ? ANOMALURUS LANIGER.

1853. *Anomalurus laniger*, Temminck, Esquisses Zoologiques, p. 149.

Above grizzled grey, washed along the spine and on the shoulders with rufous; tail brown. Throat and breast rufous, rest of the lower parts reddish white. Fur throughout short, thick, woolly, and crisp. Measurements of a dry skin:—head and body 9 in., tail 7.

*Hab.* West Africa, exact locality not known (*Leyden Mus.*).

I have not seen Temminck's type, which is described as not fully grown and in bad condition. Probably it is the young of the last species, in which the fur is certainly shorter and more woolly than in the others.

## 5. ANOMALURUS FULGENS. (Plate XXI.)

1867. *Anomalurus fulgens*, Gray, Ann. & Mag. Nat. Hist. (4th ser.), iii. p. 469.

Nearly uniform bright rufous, rather paler below, and passing to

\* Cf. Gray, P. Z. S. 1861, p. 275.

† Cf. P. Z. S. 1862, p. 180.

whitish on the sides of the abdomen; a small white spot between the ears. Measurements of a dried skin:—head and body 14 in., tail 7.

*Hab.* Gaboon (*Brit. Mus.*).

As far as I am aware, the type specimen of this very handsome species is still the only one which has been brought to Europe; and as it has not hitherto been figured, I have chosen it as the subject of the accompanying plate.

5. Notes on the Nest and Egg of *Hypolais caligata* and on the Egg of *Charadrius asiaticus*, Pall., together with Remarks on the latter Species and *Charadrius veredus*, Gould. By H. E. DRESSER, F.Z.S. &c.

[Received February 1, 1875.]

A few meetings ago I exhibited the nest and eggs of *Hypolais rama*, together with the eggs of all known European species of *Hypolais* excepting *H. caligata*, which I then said I expected would closely resemble those of *H. rama*\*. Since then I have received, through Mr. Wilhelm Schlüter, of Halle, a nest and egg, together with the bird, of *Hypolais caligata*, collected by a correspondent of his in the Kirghis steppes. These I have now the pleasure to exhibit; and it will be seen that both nest and egg differ not a little from those of *Hypolais rama*, collected by Mr. Blanford in Persia. The egg, compared with those of that species, bears about the same affinity as the egg of *H. polyglotta* does to that of *H. pallida*, Ehr. (*H. elatica*, auctt.), being smaller and more pink in general hue, being of a delicate very pale pinkish white colour, sparingly dotted and marked with black and to a slight extent with dark purplish underlying shell-markings. In size the single egg I possess measures 0·6 by 0·475 inch; and, like those of *H. polyglotta*, it is rather stout in form and scarcely so elongated as the eggs of *H. rama*. The nest is a much stouter and more compact structure than that of *H. rama*, and not so deep in the cup. It is carefully built of stems of plants, grass-bents, and fine roots, and is carefully lined with finer bents and a few hairs. The skin sent with the nest and egg agrees closely with a specimen from the Ural, which I compared, and which agreed with the type specimen sent to me from Berlin for examination, as also with examples sent to me from India labelled *Jerdonia agricolensis* and *Phyllopneuste agricolensis* by Mr. W. E. Brooks.

Amongst other specimens received with the above, through Mr. Schlüter, from the Kirghis steppes, are two skins, male and female, in full breeding-plumage, of *Charadrius asiaticus*, Pall., together with an egg of that species, which latter is especially interesting, because the egg of that rare wader appears, so far as I can gather, to have been hitherto unknown.

This egg, which I now exhibit, somewhat resembles those of *Eu-*

\* See P. Z. S. 1874, p. 655.

*dromias morinellus*, but is darker and rather more green in tinge of ground-colour than the general run of those eggs, besides being much less spotted and more oval in shape. It is, as will be seen, warm buff, with the faintest greenish tinge, and sparingly spotted with black, the markings being comparatively small and not large blotches as in those of *E. morinellus*. In size it measures 1.25 by 1.075 inch, and is oval in shape, very slightly tapering towards one end.

It is especially interesting to obtain not only the egg of this species but the bird itself from the locality whence it was originally described. It will be recollected that in 'The Ibis' for 1870, p. 201, Mr. Harting gave a full account of this species and of its close ally *Charadrius veredus*, Gould; and in 1872 (*Ibis*, 1872, p. 144) Dr. Otto Finsch published some notes on these two species, in which he sought to show that the bird referred to by Mr. Harting under the name of *Eudromias asiaticus* should stand as *C. damarensis*, and that his *E. veredus* is the true *C. asiaticus* of Pallas. These specimens, however, which I now exhibit, tend to prove that Mr. Harting was quite right in his identification of Pallas's *C. asiaticus*; but all the distinctive characters of the two species as given by him (*Ibis*, 1870, p. 212) do not always hold good. For instance he states that all the primaries of *C. asiaticus* have the shafts mesially white. This is certainly the case in some specimens I possess, and also in the female obtained from the Kirghis steppes; but the male has the shaft of the first primary only white, almost all the rest being as dark as the web of the feather.

The best distinctive character besides measurements is the colour of the axillaries, which in *C. asiaticus* are invariably white, and in *C. veredus* dark smoke-grey. I cannot but think that there is some mistake in the colour of the tarsus of *C. asiaticus* as given by Mr. Harting, who, both in his description and in the plate, gives it as being *greenish* ochreous. Now Pallas expressly states that the colour of the tarsus is yellowish; and in his plate (*Zoogr. Ross.-As.* ii. pl. 58) he figures the bird with the legs ochreous yellow. I do not know where Mr. Harting obtained the particulars he gives as to the colour of the tarsus being greenish; but it is possible that the description may have been taken from a young bird, and that the young have the tarsus darker than the old birds; or else, as in some other waders, the colour of the tarsus may vary at different seasons of the year.

I observe that Mr. Harting follows Keyserling and Blasius in referring both *C. asiaticus* and *C. veredus* to the genus *Eudromias*; but I have grave doubts as to this being correct. In *Eudromias* (the type of which is *E. morinellus*) the female is more richly coloured than the male, whereas in both the above species the female lacks the rich nuptial dress of the male and is not unlike its mate in winter dress. Professor Newton has pointed out to me that the sternum of *E. morinellus* differs greatly from that of true *Charadrius*; and it will be interesting to ascertain, so soon as a skeleton of either *C. veredus* or *C. asiaticus* can be procured, whether these species assimilate to *Eudromias* or to true *Charadrius* in that respect. Meanwhile I think it advisable to refer them to the latter group.

6. On a Collection of Birds from Labuan. By R. BOWDLER SHARPE, F.L.S., F.Z.S., &c., of the Zoological Department, British Museum.

[Received February 2, 1875.]

(Plate XXII.)

Mr. Hugh Low, well-known for his researches into various branches of Natural History in Borneo, has lately sent over to England a collection of birds, which I have had the pleasure of examining. The locality whence this collection came, Labuan, has been brought prominently under the notice of ornithologists by the little work of Messrs. Motley and Dillwyn, wherein many fine species are figured\*. The present consignment of Mr. Low, however, contains many species before unknown to inhabit the island; and it adds more than one species to the Bornean avifauna, on which Count Salvadori has recently written such an excellent work†. The latter has been of the greatest assistance to me in the determination of the species mentioned in the present paper.

#### Family STRIGIDÆ.

1. *NINOX BORNEENSIS*, Bp.; Salvad. *l. c.* p. 18.

Three specimens sent by Mr. Low are apparently referable to this species, having the same number of tail-bands (four) as a Sarawak skin; but all three of the Labuan birds are of a very dark colour, almost blackish chocolate, and have no perceptible white on the face and throat; in this respect they contrast strongly with the above-mentioned Sarawak bird, which was collected by Mr. Wallace.

#### Family CAPRIMULGIDÆ.

2. *BATRACHOSTOMUS AURITUS*.

An adult specimen, agreeing in the main with Malaccan examples. This large Goatsucker is not included by Count Salvadori.

3. *BATRACHOSTOMUS JAVENSIS* (Horsf.); Salvad. *l. c.* p. 112.

One example, rather darker and greyer than those examined from other localities, but apparently not specifically distinct.

4. *CAPRIMULGUS SALVADORII*, sp. n. (Plate XXII. fig. 1.)

Blackish: head greyer, very finely vermiculated whitish, with many of the feathers in centre of crown black, others centred with black; hind neck with a few rufous bars, disappearing on interscapular region; wings blackish brown, with a few fulvous vermiculations

\* Contributions to the Natural History of Labuan and the adjacent coasts of Borneo. 8vo, London, 1855.

† "Catalogo sistematico degli Uccelli di Borneo con note ed osservazione di G. Doria ed O. Beccari intorno alle specie da essi raccolte nel Rajato di Sarawak," Ann. Mus. Civico Genoa, vol. iv.

towards the tips of the feathers, which are subterminally barred with fulvous or whitish, the innermost very broadly and plainly barred with sandy buff; scapulars black in the centre, with broad marginal bands of sandy buff; primary coverts and quills blackish, the secondaries vermiculated with sandy buff, the innermost greyish; first four primaries with a large white spot, extending on to both webs in the second, third, and fourth; centre tail-feathers greyish brown, vermiculated with sandy buff and crossed with eight bars of darker brown, the rest of the feathers dull brown, crossed with about eight vermiculated bands of fulvous, none of them very distinct, the two external feathers almost uniform except for a few notches of sandy buff on the outer web, the terminal third being pure white; sides of face rufescent, mottled with dark brown bars, the cheeks whitish, barred with brown and forming an indistinct moustachial stripe; throat rufous, mottled with brown bars, on the lower part a distinct gular patch of white; chest ashy brown, barred with buffy white, all the feathers more or less mottled with fulvous vermiculations; remainder of under surface fulvous, barred with dusky brown; under wing-coverts dark brown, barred across with sandy buff, the lower series uniform blackish like the inner lining of the wing. Total length 9 inches, culmen 0.45, wing 7.0, tail 4.9, tarsus 0.6.

I cannot identify this Goatsucker with any Malayan species, most of which are in the museum. The species given by Count Salvadori are *Caprimulgus affinis*, *C. arundinaceus*, *C. macrurus*, *C. borneensis*, and *C. concretus*; and with none of these does it agree at all.

With regard to *C. borneensis*, described by Mr. Wallace for the first time in Count Salvadori's book, there can scarcely be a doubt that it is the true *C. concretus* of Bonaparte. Mr. Wallace had very probably overlooked the correction of the Ashantee habitat of this bird given in the 'Conspectus' (p. 60), and doubtless did not compare his Bornean bird with the description of an African species. The great peculiarities of *C. borneensis* are the broad transverse white markings on the under surface and the unspotted quills, both of which are mentioned in Bonaparte's description. The large white tail-spots and the four spots on the quills are very prominent characters in *C. salvadorii*. I may add that the types of *C. borneensis* from Banjermassing are in the museum and before me as I write. The figure of *C. concretus* (Plate XXII. fig. 2) is from one of these typical specimens.

#### Family ALCEDINIDÆ.

5. *CEYX SHARPII*, Salvad. Atti R. Ac. Tor. iv. p. 463; Sharpe, Monogr. Alced. pl. 42; Salvad. Ucc. Born. p. 98.

Count Salvadori points out that the figure of this species in my 'Monograph' is "very inaccurate;" but beyond the difficulty which any one will find in representing the exact brilliancy of a lilac tint by the hands of colourists, I cannot allow the inaccuracy of the plate. The fault lies more with the species, for three specimens of *C. sharpii* occur in the present collection along with *C. dillwynni*, and I feel tolerably certain that Count Salvadori's species will turn out ulti-

mately to be only a stage of the last-named bird. They all possess in a greater or less degree the blue terminal spots to the median wing-coverts, and are generally of a more brilliant shade than the ordinary *C. rufidorsa*; all have, also, red tails and coral-red beaks. One of them has the wing-coverts rufous; but the other two exhibit a tolerable admixture of black. The black line running along the hinder scapulars, so apparent in the typical specimen, exists only in one of the examples; and there it is also so shaded with blue as closely to approach *C. dillwynni*. None of the specimens of *C. sharpii* has the frontal spot, which is plainly marked in all three of *C. dillwynni*.

Having examined the types both of Strickland's *C. rufidorsa* and Salvadori's *C. innominata*, I can affirm that they are absolutely one and the same species; and the latter title must therefore give way.

6. CEYX DILLWYNNI, Sharpe, P. Z. S. 1868, p. 591; *id.* Monogr. Alced. pl. 43; Salvad. Ucc. Born. p. 99.

I was delighted to see three more specimens of this previously unique Kingfisher. The type was originally described by me from a Labuan specimen procured by the late Mr. Motley, and apparently was quite adult, judging from the specimens now sent, which have short and brownish beaks. In the main they agree with the description and figure of the type in my 'Monograph;' and all have blackish tails, more or less rufous at the base of the feathers.

7. ALCEDO MENINTING, Horsf.; Salvad. Ucc. Born. p. 93.

*Alcedo asiatica*, Sw.; Sharpe, Monogr. Alced. pl. 5.

The receipt of three specimens in Mr. Low's collection strengthens my opinion expressed in the 'Monograph,' that the Bornean examples of this Kingfisher are not different from those inhabiting other parts of the Indo-Malayan subregion. The only really variable form of *A. meninting* that I am aware of is the bird now called by Lord Walden *Alcedo beavani*. Lord Walden has now seen several specimens, and he may therefore be right in considering *Alcedo beavani* a distinct species; but I should like to compare a series of both before admitting that it is any thing more than a large race of *A. meninting*. A very young bird sent by Mr. Low is very similar to the adult birds, and is even more brilliant cobalt on the back, but differs in the short beak, which is black with an ivory-white tip.

8. HALCYON PILEATA (Bodd.); Sharpe, Monogr. Alced. pl. 62.

*Entomobia pileata*, Salvad. *l. c.* p. 102.

One example known from Sarawak, but not previously met with in Labuan.

#### Family MEROPIDÆ.

9. MEROPS BICOLOR, Bodd.; Salvad. *l. c.* p. 90.

Mr. Low has sent quite a series of this Bee-eater, the adults not presenting any remarkable variation beyond a certain difference in

the colour of the wing-coverts and scapulars, which vary in the amount of blue shading. The greener ones are probably females, or perhaps young birds, as the latter have the scapulars entirely green.

In the present collection is a little nestling, a most interesting specimen, as it differs somewhat from the full-grown young birds previously seen by me. It is of a dull olive-green above, the tail bluer than the back, the lower part of which and the rump have the usual cobalt appearance, but not so bright as in the adults; the wings are slightly brighter green than the back; ear-coverts black; chin and cheeks yellowish, shading off into cobalt streaks on the lower throat and hinder part of cheeks; breast bright grass-green, gradually shading off into bluish white on the abdomen and under tail-coverts; under wing-coverts and bases of quills dull chestnut, those round the bend of the wing dull green.

#### Family TROGONIDÆ.

##### 10. *HARPACTES DUVAUCELI* (Temm.).

*Pyrotrogon duvaucelii*, Salvad. *l. c.* p. 29.

Two fully adult males.

##### 11. *HARPACTES DIARDI* (Temm.).

*Pyrotrogon diardi*, Salvad. *l. c.* p. 28.

Two males and a female of this species are contained in the present collection. One of them has a black head, with a very slight wash of crimson; but the other has a deep crimson head, the black colour being quite obscured. May not this crimson-headed bird account for *H. erythrocephalus* having been admitted into the Bornean avifauna? Count Salvadori is doubtless right in discrediting its occurrence in the island.

#### Family BUCEROTIDÆ.

##### 12. *HYDROCISSA ALBIROSTRIS* (Shaw); Salvad. *l. c.* p. 82.

A series of this species, differing much in shape of bill.

#### Family CAPITONIDÆ.

##### 13. *MEGALEMA VERSICOLOR* (Raffl.).

*Chotorea versicolor*, Salvad. *l. c.* p. 33.

One adult example.

#### Family PICIDÆ.

##### 14. *YUNGIPICUS SONDAICUS*, Wall. in Salvad. Ucc. Born. p. 43.

Count Salvadori's title of *fusco-albidus* for this species must sink into a synonym of Mr. Wallace's name above quoted, if the latter gentleman is correct in supposing the true *P. moluccensis* to be the large species from Lomboc and Flores. I have compared the two Labuan examples now sent by Mr. Low with the type of *P. sondaicus*, and find them to be the same species.



15. *CALLOLOPHUS PUNICEUS* (Horsf.); Salvad. *l. c.* p. 49.

This species appears to be new to Labuan. One example is sent on the present occasion.

16. *CALLOLOPHUS MALACCENSIS* (Lath.); Salvad. *l. c.* p. 50.

Two specimens of this Woodpecker, which is new to Labuan.

17. *THRIPONAX JAVENSIS* (Horsf.); Salvad. *l. c.* p. 52.

An adult specimen.

18. *GRAUCOPICOIDES RAFFLESII* (Vig.); Salvad. *l. c.* p. 54.

Male and female of this species, which is also here recorded from Labuan for the first time.

19. *MEIGLYPTES TRISTIS* (Horsf.); Salvad. *l. c.* p. 56.

Comparing the single Labuan skin now sent with one from Sarawak (*Wallace*), I find that they both differ from Malaccan and Sumatran examples in being more numerously banded underneath, and in having the cross bars more rufous. Certain indications, however, of an intermediate plumage in the Sarawak bird incline me to agree with Count Salvadori in uniting the two species, and not considering the *M. grammithorax* (Malh.) distinct.

20. *MEIGLYPTES TUKKI* (Less.); Salvad. *l. c.* p. 57.

A pair of these birds are sent by Mr. Low; and on comparing them with a pair from Malacca and Sumatra collected by Mr. Wallace I notice more differences than were evident in the case of the foregoing species. The Labuan specimens are more rufous underneath; and the heads are browner, whereas the Malaccan examples have a greyish crown. The black on the chest is very much broader in the Labuan examples.

21. *MICROPTERNUS BADIUS* (Temm.); Salvad. *l. c.* p. 58.

One specimen. This species has never been sent from Labuan before; but the Museum contains a Sarawak specimen obtained by Mr. Wallace. It entirely agrees with the excellent diagnosis given by Count Salvadori for the species (p. 59), and has not the uniform first primary mentioned by some authors. I cannot agree that it is the same as *M. brachyurus* of Malacca, as it seems to be a darker bird altogether, and has the tip of the tail quite black for more than its apical third. The crimson colour round the eye also appears to consist only of a few scattered dots, and not to form a patch or small spot as in the Malaccan species.

22. *SASIA ABNORMIS* (Temm.); Salvad. *l. c.* p. 60.

Two males and a female. This species has not been before recorded from Labuan. I cannot see the slightest difference between Bornean and Malaccan examples of either sex.

## Family CUCULIDÆ.

23. RHOPODYTES ERYTHROGNATHUS (Hartl.); Salvad. *l. c.* p. 74.

One fine example. On comparing it with Malaccan and Sumatran specimens it shows a more conspicuous blue-grey chin than any of the latter; but so many have a slight indication of it, that I think it may very likely be a sign of age or sex.

24. RHINORTHA CHLOROPHÆA (Raffl.); Salvad. *l. c.* p. 69.

Three pairs of this species, which is known from other parts of Borneo, where it seems to be plentiful. This is, however, its first recorded appearance in Labuan.

## 25. POLIOCOCCYX SUMATRANUS (Raffl.); Sharpe, P. Z. S. 1873, p. 606.

*Rhopodytes sumatranus*, Salvad. *l. c.* p. 73.

Three specimens. They do not show so much rufous on the abdomen as the Malaccan and Sumatran specimens; but this seems a somewhat variable character.

## Family PSITTACIDÆ.

26. PALÆORNIS LONGICAUDA (Bodd.); Salvad. *l. c.* p. 22.

One adult specimen. The sides of the face and hind neck are shaded with lilac; and the edge of the wing is green, the breast being also washed with greenish blue. These are probably signs of a very old bird.

## Family PITTIDÆ.

## 27. BRACHYURUS MUELLERI.

*Melanopitta mülleri*, Walden, Ibis, 1872, p. 374.

A fine series of this Pitta is sent by Mr. Low, and in addition to these a pair of birds with the nest and eggs. These two specimens bear out Lord Walden's remarks about the extent of black in the wing exhibited by Mr. Everett's pair from Marup (*l. c.*); and thus it is probable that the female does not get the white quills which exist in the majority of Bornean specimens. At all events the extent of white in the wing seems to me to be a character of the least possible importance for separating species in this black-headed group; but at the same time, accompanying the greater extent of white on the quills is generally seen a shade of more vivid blue both on the back and breast, and birds with these characteristics also appear to have black tails without any terminal shade of green. I must, however, admit that all these characters are very variable; for the bird sent with the nest, which I look upon as the female on account of the amount of black on the wing, has a very distinct bluish lustre, and is bright green below. I regret that the condition in which this specimen arrived was such as to render its conservation in a collection impossible, such havoc had moths played with it.

On comparing these Bornean Pittæ with two of Mr. Wallace's

Sumatran specimens, I fail to find any specific difference at all, and agree with previous authors who have united them.

The nest is a rude structure, apparently taken off the ground, and composed of fine roots and slender twigs, with a few dead leaves and dry moss. The four eggs sent are white, with scribblings of dark grey or chocolate-brown freely distributed all over the surface, but nowhere so thick as to obscure to any extent the white ground of the egg.

#### Family TIMALIIDÆ.

##### 28. *MACRONUS PTILOSUS*, J. & S.; Salvad. *l. c.* p. 216.

This species has not before been noticed from Labuan; but Mr. Low sends a pair with the nest and eggs. The nest appears to have been taken from the ground, and is a coarsely made structure, composed of thin roots and grasses badly welded together, with a few dead leaves round the outside. The eggs are thickly speckled with brown on a ground of dull white, and are not very unlike thickly marked eggs of the common Sparrow of Europe.

##### 29. *SETARIA AFFINIS* (Blyth); Salvad. *l. c.* p. 231.

Three specimens. New to Labuan.

##### 30. *BRACHYPTERYX MALACCENSIS*, Hartl.; Salvad. *l. c.* p. 222.

One specimen. New to Labuan.

##### 31. *MIXORNIS BORNEENSIS*, Bp.; Salvad. *l. c.* p. 215.

Several specimens.

##### 32. *TIMELIA MACULATA*, Temm.; Salvad. *l. c.* p. 211.

Three specimens.

##### 33. *CYANODERMA BICOLOR*.

*Timalia*, sp., Sclater, P. Z. S. 1863, p. 215.

*Timalia bicolor*, Blyth, Ibis, 1865, p. 46.

The series of this species sent by Mr. Low proves that it is not the true *C. erythropteron* of Blyth (*cf.* Salvad. Ucc. Born. p. 213), and that the characters communicated to Dr. Sclater by Mr. Wallace (*cf.* Sclater, *l. c.*) are of specific importance. In spite of its suggested Malaccan origin, I believe that the *Timalia bicolor* of Mr. Blyth will turn out to be the Bornean bird; and I therefore adopt the title.

*C. bicolor* differs from *C. erythropteron* in being brighter rufous above, and in having the breast and belly ochraceous brown; the entire head, throat, and chest are blackish slate-colour, whereas in *C. erythropteron* the colour of the back is extended on to the occiput and crown of the head. Count Salvadori thinks that Blyth's species may be the male; but all Mr. Low's specimens are the same; nor do the young differ materially; and my comparison of adults has been made with a sexed male specimen of Mr. Wallace's, from Sumatra.

34. *IORA SCAPULARIS*, Horsf.; Salvad. *l. c.* p. 190.

Six specimens in different plumages.

#### Family TURDIDÆ.

35. *PHYLLORNIS SONNERATHI* (J. & S.); Salvad. *op. cit.* p. 193.

A pair of this *Phyllornis*, which has been recorded from Bangermassing and Sarawak, but not before from Labuan.

36. *PHYLLORNIS CYANOPOGON*, Temm.; Salvad. *op. cit.* p. 194.

Two male specimens. Not recorded previously from Labuan.

37. *BRACHYPODIUS MELANOCEPHALUS* (Gm.); Salvad. *l. c.* p. 201.

One specimen: apparently identical with others from Malacca.

38. *COPSYCHUS AMÆNUS* (Horsf.); Salvad. *l. c.* p. 255.

One specimen.

39. *KITTACINCLA STRICKLANDI* (Motl. & Dillw.); Salvad. *l. c.* p. 253.

Three adult specimens of this beautiful species. One bird is much smaller than the others, measuring 3·6 inches in the wing and 4 inches in the tail, whereas the others have the wing 3·9 inches long and the tail 8·4.

#### Family SYLVIIDÆ.

40. *PRINIA SUPERCILIARIS*, Salvad. *l. c.* p. 249.

A single specimen, agreeing in all respects with Count Salvadori's original description.

#### Family NECTARINIIDÆ.

41. *ÆTHOPYGA SIPARAJA*, Raffl.; Walden, Ibis, 1870, p. 33.

A series of specimens of this Sun-bird, which seems to be plentiful in Labuan.

42. *CHALCOPARIA CINGALENSIS* (Gm.); Salvad. *l. c.* p. 180.

Two males and one female.

43. *CINNYRIS PECTORALIS*.

*Cyrtostomus pectoralis* (Horsf.), Salvad. *op. cit.* p. 170.

Several specimens. This species is already known as occurring in Labuan.

44. *DICÆUM TRIGONOSTIGMA*.

One male specimen.

45. *NECTAROPHILA HASSELTII* (Temm.); Salvad. *l. c.* p. 177.

Several examples.

46. *ANTHREPTES MALACCENSIS* (Scop.); Salvad. *op. cit.* p. 178.

A large series is contained in the present collection. Mr. Motley has already found it in Labuan; and it must be equally common at Sarawak, to judge from the large series mentioned by Count Salvadori as having been obtained there by the Marquis Doria and Signor Beccari.

47. *ARACHNOTHERA CHRYSOGENYS*, Temm.; Salvad. *l. c.* p. 181.

One specimen.

Family LANIIDÆ.

48. *LALAGE TERAT* (Bodd.); Salvad. *l. c.* p. 146.

One young specimen, apparently referable to this species.

Family MUSCICAPIDÆ.

49. *PHILENTOMA PYRRHOPTERUM* (Temm.); Salvad. *op. cit.* p. 138.

One specimen.

50. *CYORNIS BANYUMAS* (Horsf.); Salvad. *op. cit.* p. 130.

Two adult specimens.

Notwithstanding Count Salvadori's contrary belief, I think that a comparison of types will identify Mr. Wallace's *C. rufifrons*, now before me, with his *C. beccariana*.

51. *LEUCOCERCA JAVANICA* (Sparrm.); Salvad. *l. c.* p. 135.

An adult and a young specimen: the latter is brown where the adult is blackish, and has rufous margins to the wing-coverts.

Family EURYLÆMIDÆ.

52. *CYMBIRHYNCHUS MACRORHYNCHUS*.

A young bird, moulting into adult plumage. The tail is black, with only a faint whitish shade near the apical edge of the inner web of the outermost rectrix.

53. *EURYLÆMUS OCHROMELAS*, Raffl.; Salvad. *l. c.* p. 108.

An adult specimen, in no way different from Malaccan examples.

Family STURNIDÆ.

54. *GRACULA JAVANENSIS* (Os.); Salvad. *l. c.* p. 274.

Two specimens which, when compared with Javan examples, do not present any differences.

Family CORVIDÆ.

55. *PLATYLOPHUS CORONATUS* (Raffl.); Salvad. *l. c.* p. 280.

One young specimen.

## Family COLUMBIDÆ.

56. CARPOPHAGA BICOLOR (Scop.); Salvad. *l. c.* p. 292.

After reading Count Salvadori's remarks on this species and its allies, I was induced to compare the series in the Museum to see how far they agreed with the conclusions arrived at by him in his new work on the ornithology of Borneo. He recognizes four species of this group, of which two are undoubtedly valid (*C. luctuosa* and *C. grisea*); and the question is whether *C. spilorrhoa* of Australia is distinct from the ordinary *C. bicolor* of Malayasia. Now Professor Schlegel has united these two birds in one long series, duly noting the differences existing in birds from various localities; and his conclusions amount to the fact that in the Malay countries the under surface is, as a rule, pure white, that in the Australian birds there are black spots on the lower abdomen and under tail-coverts, and that in the intermediate localities there are gradations uniting these extreme forms, so that sometimes both spotted and unspotted birds were found in one and the same island. Count Salvadori duly admits the instability of the black spots as a character, but separates *C. spilorrhoa* on account of its having only twelve tail-feathers against fourteen in *C. bicolor*. It is by some accident that the Australian specimens examined by him only had twelve tail-feathers; for all those before me have fourteen rectrices; and therefore Professor Schlegel most likely did not mention the number of tail-feathers simply because he saw no difference in this character between Australian and Moluccan examples. The amount of white on the outer tail-feather is, again, a character which varies exactly in the same degree and is not the same in birds from the same locality. The *C. melanura* of Gray was founded on Bouru examples which have very little white on the outer tail-feather, which is black for about the terminal third. I give the following list of specimens in the British Museum.

*Nicobars.* A male collected by Capt. Wimberley on Nancowry Island (Jan. 24th, 1874).—Wings black, with the slightest possible shade of grey on the primaries. Tail-feathers 14, white extending to within 0·6 inch of tip of outer feather. No spots on abdomen.

*Siam.* Two specimens collected by Mouhot.—Wings black, with scarcely any shade of grey on the quills. Tail-feathers 14, white extending to within 0·55 inch of tip of outer feather. Slight remains of black spots on vent of one specimen; the other entirely white.

*Province Wellesley.* One specimen.—Wings and tail imperfect; only very slight shade of grey on the former, the white extending to within 0·45 inch of the tip of outer rectrix; under surface white, with remains of a blackish spot at tip of longest under tail-covert.

*Java.* One specimen, purchased of Mr. Stevens in 1861.—Wings black, with rather more grey than on the foregoing birds, the secondaries also washed with this colour. Tail-feathers 14, the white extending on outer rectrix to within 0·4 inch of its tip. No black spots on the vent or under tail-coverts. In this bird the amount of white is more extended on one outer tail-feather than on the other;

for it even traverses obliquely the inner web to within  $\frac{1}{10}$  inch of its apex.

*Labuan.* One bird, sent by Mr. Lowe.—Very slight shade of grey on the wings, but seen also on the secondaries. Tail imperfect, the white extending to within 0.45 inch of tip of outer rectrix. Slight remains of greyish spots at the end of some of the tail-coverts.

*Bouru.* Three specimens, agreeing well together, were received by the Museum from Mr. Wallace's collection.—The markings on the tail being more black and extended refer the species to the *C. melanura* of Gray. Wings black with very faint shade of grey. Tail-feathers 14, the white extending to within 0.65–0.9 inch of the tip of outer rectrix. Both specimens well marked with black on abdomen and under tail-coverts.

*Gilolo.* One specimen, collected by Mr. Wallace and referred by him to *C. melanura* of Gray.—Wings black, with very slight grey shade. No black spots on abdomen. Tail-feathers 14, with the white on the outer one reaching to within 0.6 inch of the tip.

*Batchian.* A single bird in Mr. Wallace's collection is the type of *C. melanura*, and bears the label in Mr. Gray's handwriting "outward feathers not white." The latter gentleman refers the foregoing Gilolo skin to this same species; but the tail is differently marked in this one, and the abdomen thickly spotted with black. Wings black, with a slight grey shade. Tail-feathers 12; but it is quite probable that the outer feather on each side is missing; and the disappearance of the oblique white marking of course would leave the black forming a tolerably broad band across the extremity of the tail, as it does in nearly every example of the group.

*Ceram.* Mr. Wallace collected one specimen in this island, much marked with black on the abdomen. Wings black, very plainly shaded with grey on both primaries and secondaries. Tail-feathers 14, the white descending on the outermost one to within 0.7 inch of the tip.

*Ambonina.* From this island we have also one specimen, a male, collected by Mr. Wallace in 1859. Both the abdomen and under tail-coverts are thickly marked with black. Wings black, slightly shaded with grey. Tail-feathers 14, with the white extending to within 0.85 inch of the tip of the outermost.

*New Guinea.* Mr. Wallace has determined a specimen collected here by himself as *C. bicolor*; and I do not see to what else it could be referred. The under surface is entirely white, with only a small blackish spot at the tip of the longest under tail-coverts. Wings black, very strongly shaded with grey. Tail of 14 feathers, the white extending to within 0.55 inch of the tip; but on one side it is more extended and reaches nearly to the tip of the outer web, occupying a large subterminal portion of this feather.

*Aru Islands.* Two birds collected here by Mr. Wallace are determined by Mr. Gray as "*C. spilorrhoa*, var." They are rather large, and have a good deal of grey shade on the wing, the vent and under tail-coverts distinctly spotted with black. Tail-feathers 14 in

number, the white on the outer one very much extended and reaching across the outer web of the external rectrix, comes within 0·3–0·45 inch of the tip of the feather.

*Australia.* A male from Port Essington obtained by Mr. Jukes has the abdomen and under tail-coverts spotted, as, indeed, have all the Australian specimens. Wings black, strongly shaded with grey. Tail-feathers 14, the outer tail-feather almost entirely white, excepting a margin of black along the basal half of the outer web and a narrow terminal band about 0·25 inch in width. Two other birds, collected on Cairncross Island during the voyage of the 'Rattlesnake,' agree with the Port-Essington example in having a very decided grey shade on the wing, and have the under tail-coverts much spotted. In both of these the rectrices are 14 in number, but the black border to the outer web of the external one extends, though more narrowly, right along the edge of the feather, while the black terminal border is much broader. These Australian birds with their grey-washed wings and whiter tails are nearer to *C. luctuosa* of Celebes.

The above comparison of specimens proves to me pretty clearly that Professor Schlegel is right in uniting *C. spilorrhoea* to *C. bicolor*; for certainly no one can draw the line between them. As a rule the Indo-Malayan examples at one end of the series have unspotted abdomens and more black on the tails, while the Australian birds are tolerably thickly spotted on the abdomen and have more white on the tails; and at the same time I must observe that I have never seen an Australian example with unspotted under surface. As will be seen, however, by my observations made above, there is no limit to any of these characters, nor are the variations coincident with locality.

#### 57. *CALÆNAS NICOBARICA.*

Mr. Low has sent quite a long series of this bird, which nevertheless seems to be new to the avifauna of Borneo, as it is not included in Count Salvadori's book. The specimens agree exactly with others from the Nicobars and the Moluccas.

#### Family TRERONIDÆ.

#### 58. *TRERON VERNANS* (L.); Salvad. *l. c.* p. 286.

A pair of this Dove are sent by Mr. Low; and I have compared them with others in the Museum from the Philippines, Sumatra, Penang, Sarawak, Macassar, Tenasserim, and Siam. I cannot find any real difference between examples from all these localities. Sometimes the greenish shade on the forehead is absent; but this character is not constant, some specimens from the same place having this shade and others not showing it. The extent of the vinous colour on the neck also varies in extent, and I can find no constancy in this character also.



## Family MEGAPODIIDÆ.

## 59. MEGAPODIUS LOWII, sp. n.

*Megapodius cumingii*, Dillw. P. Z. S. 1851, pl. 39 (*nec descr.*); Motl. & Dillw. N. Hist. Labuan, p. 32, pl. 7; Salvad. Ucc. Born. p. 302.

Mr. Dillwyn described the habits of the Labuan Megapode chiefly from notes supplied by Mr. Low, whose name I propose to attach to the species. In characterizing the bird he bestows the title on the Philippine species, and supposes that the Labuan birds are identical. At present I cannot coincide with this opinion; for all the birds sent by Mr. Low on the present occasion are smaller and darker than the true *M. cumingii*, especially on the breast, which is deep plumbeous grey, whereas in the Philippine bird the under surface is brownish washed with grey; the legs in the Labuan species also are nearly entirely black, the tarsal joint not being reddish as in *M. cumingii*.

A nestling sent by Mr. Low differs from that of the Philippine species in being more uniform above, instead of being distinctly barred with rufous.

	Total length. in.	wing. in.	tail. in.	tarsus. in.
<i>M. cumingii</i> (Philippine Islands)	16·0	10·0	3·7	2·5
<i>M. lowii</i> (Labuan) .....	14·5	8·1	3·1	2·4

## Family RALLIDÆ.

## 60. RALLINA FASCIATA (Raffl.); Salvad. l. c. p. 337.

A good many specimens of this species were sent, including some young ones. These are dusky brown, the wings spotted as in the adult, but the markings whitish instead of fulvous; head ashy brown, washed with rufous; sides of face and chest greyish, also washed with rufous; throat buffy white; under surface of body whitish, broadly barred with black like the adult, but the markings not so deep as in the latter.

## 61. ERYTHRA PHÆNICURA (Penn.); Salvad. l. c. p. 340.

One specimen; already procured by Motley in Labuan.

## Family LARIDÆ.

## 62. STERNA CRISTATA, Steph.; Salvad. Ucc. Born. p. 376.

An adult specimen of this Tern, already known from Labuan, where it was obtained by Messrs. Motley and Dillwyn.

March 2, 1875.

Osbert Salvin, Esq., F.R.S., in the Chair.

The following extract was read from a letter addressed to the Secretary by Dr. W. Peters, F.M.Z.S.

"Dr. Gray has figured, in the 'Proceedings' for 1873 (p. 393), a skull of a species of Tortoise of the genus *Sternothærus*, but does not give a name to the species.

"It will interest you to know that the skull in question belongs to *Sternothærus niger*, Dum. et Bibr., the habitat of which was not previously known. MM. Duméril and Bibron supposed that it might be from Madagascar; but no traveller has found it there, and I have now received the species from the Cameroons, West Africa, where it was found by Dr. Reichenow and Prof. Buchholtz."

The following papers were read:—

1. Descriptions of some rare Eggs of Australian Birds.

By EDWARD P. RAMSAY, C.M.Z.S.

[Received February 22, 1875.]

1. *PTILONORYNCHUS HOLOSERICEUS*, Kuhl; Gould, B. of Austr. vol. iv. pl. 10.

The eggs of this species bear a close resemblance to those of the Spotted Bower-bird (*Chlamydodera maculata*) both in form and colour; and when those of the Cat bird (*Ælurædus smithii*) and of the Regent bird (*Sericulus melinus*) are made known to us, I have no doubt that they also will be found to have similar peculiar and characteristic markings.

The eggs of the Satin bird are slightly larger than those of the Spotted Bower-bird, more strongly marked if any thing, have the same thin delicate shell and elongated form; in length they average 1·6 inch, in breadth 1·1 inch, are of a light rich cream-colour, and are marbled all over, more closely at the thicker end, with short wavy irregular lines of deep olive-brown, umber, and sienna. These markings are peculiar in form, some resembling ill-shaped figures of fives, eights, and sevens, others being long and wavy, but few if any encircling the shell altogether. These lines are thick in proportion to their length, and in places are looped, curled, and twisted in various directions, often crossing each other at right angles.

2. *EUROSTOPODUS ALBOGULARIS*, Vig. ; Gould, B. of Aust. ii. pl. vii.

I found this species of Goatsucker tolerably plentiful in certain localities in Queensland, near the headwaters of the Mary river, when I was procuring specimens of *Ceratodus* in 1873. During the daytime they are seldom if ever seen, except when flushed ; and in every instance it was on the sides of strong thickly timbered ridges that we met with them. For about half an hour just before dusk they frequent open glades and paddocks, and may then be procured on the wing. Their flight is very swift and noiseless.

Their single egg is placed on the ground, usually near a small tree or large stone, and is very difficult to discover, although the bird may have risen only a few feet in front of you. It is of a pale cream-colour, spotted sparingly over the surface with round and oval-shaped dots of deep blackish brown, with a few spots of blackish slate-colour appearing as if beneath the surface of the shell.

The length of the egg varies from 1·4 to 1·5 inch, the breadth from 1·04 to 1·01, an average specimen being 1·41 by 1·03.

3. *EUROSTOPODUS GUTTATUS*, Vig. & Horsf. ; Gould, B. of Aust. vol. ii. pl. 8.

The Spotted Goatsucker lays an egg similar to that of *Eurostopodus albugularis*. It is, however, smaller and has fewer markings ; the ground-colour is of a greenish white, glossy, and sparingly marked with round and a few oval-shaped dots of black and blackish slate-colour, which latter appears as if beneath the surface of the shell. The length is 1·38 inch, the breadth 1 inch.

Like the preceding species, this bird selects a thinly timbered stony ridge, where on the bare ground it deposits its egg without making any nest or disturbing any of the stones or gravel in the vicinity. The only specimens I possess were taken by James Ramsay, Esq., near the Merule Creek, in the Riverina district, in the southern portion of New South Wales.

4. *CAPRIMULGUS MACROURUS*, Horsfield ; Gould, B. of Aust. ii. pl. 9.

In some former remarks on Australian birds' eggs (Ibis, 1866, p. 326) I described the egg of this bird as that of *Eurostopodus albugularis*. The specimen was furnished by Mr. Rambird, of Port Denison, who had taken it from the adult of what he at the time believed to be the White-throated Goatsucker : in fact Mr. Rambird sent to me what he believed to be the skin of the identical bird ; but in this he must have been mistaken ; and, considering the plumages of these birds are so nearly alike, I do not wonder at the mistake. I have since, however, obtained eggs of undoubted authenticity of all three species of Goatsuckers (*Cuprimulgus macrourus*, *Eurostopodus albugularis*, and *E. guttatus*) ; the first of these I will now proceed to describe.

The eggs of the Long-tailed Goatsucker (*C. macrourus*) so closely resemble those of the European species that but little difference is

discernible. They are in length 1·1 inch, and ·81 in breadth, of a light rich cream-colour when fresh, fading to almost white after being emptied, clouded with fleecy marks of pale slaty grey or bluish grey appearing beneath the surface of the shell; they are of an oval form, and two in number. They are placed on the bare ground, in a similar situation to that chosen by the *Eurostopodi*, usually on a strong ridge.

2. Notes on *Falco labradorus*, Aud., *Falco sacer*, Forster, and *Falco spadiceus*, Forster. By H. E. DRESSER, F.Z.S. &c.

[Received February 5, 1875.]

Amongst some Jer Falcons, below referred to, sent to me for examination by Professor Spencer F. Baird, was one of the Black or Labrador Jer Falcon, which, although not in the darkest stage of plumage, at once struck me as being a very good species, totally distinct from any other form of the Jer or Iceland Falcons. When in Brunswick in the autumn of 1873 I had the opportunity of examining a magnificent series of these Labrador Jer Falcons in the museum of that city, and was then fully confirmed in my opinion that they belonged to a totally distinct species. I tried to obtain one of these birds, but was unsuccessful, and have since then been using every endeavour to secure a specimen for my collection. Fortunately my exertions have at last been crowned with success, and I am now enabled to exhibit three examples of this rare Falcon just received from Labrador.

Mr. Sharpe, in his recently published Catalogue of Accipitres, refers this Labrador Jer Falcon to the true *Falco gyrfalco*, L.; but this is evidently an error, which has doubtless arisen from the want of specimens for examination. A glance at the birds I now exhibit, together with my series of specimens of *F. gyrfalco* from Scandinavia, will at once show how very distinct these two forms are. As will be seen, my three specimens are in different stages of plumage—one being dull dark sooty brown, streaked on the head with white, and marked and spotted on the underparts with buffy white, the chin being white streaked with sooty brown, and the upper parts of the body having lighter margins to the dark feathers. Tail dark sooty brown, the central feathers unmarked, and the outer rectrices barred on the inner web with pale yellowish white.

The second specimen resembles the first, but is much darker and less marked with buffy white; but the third is very dark, the upper surface of the body being uniform sooty blackish brown, with a slaty grey shade on the rump; the head nearly black; tail uniform blackish brown, with a few dull buff spots at the extreme tip; underparts like the back, but very sparingly marked with buffy ochreous streaks; the edge of the wings similarly marked; under tail-coverts blackish brown, spotted with light ochreous buff.

According to Mr. Ridgway (N. Am. Birds, iii. p. 117) the dark birds are the adult, and the lighter birds the immature; and I must

confess that I lean to this opinion also. Should this be the case, this species assimilates to *F. gyrfalco*, in which the young birds are lighter than the adults, rather than to *F. islandus* and *F. candicans*, in which the adults wear a much lighter livery than the young birds. The synonymy of this Labrador Jer Falcon will be as follows:—

#### FALCO LABRADORUS.

*Falco labradora*, Aud. B. Am. pl. cxevi. (1831).

*F. (Hierofalco) gyrfalco*, var. *labradora*, Ridgway, N. Am. Birds, iii. p. 117 (1874).

*Hierofalco gyrfalco* (L.), Sharpe, Cat. of Accipitres, i. p. 416 (1874, partim, nec Linn.).

Mr. Ridgway (North Am. Birds, iii. p. 115) separates the American Jer Falcon from our European species, calling it MacFarlane's Gerfalcon, *F. (Hierofalco) gyrfalco*, var. *sacer*, Forst.; but I feel convinced, from an examination of specimens from America, that there is no specific or even subspecific difference whatever between them. Some time ago Professor Spencer F. Baird courteously forwarded to me five specimens of Jer Falcons for examination, viz.:—*a*, ♀. Fort Anderson, Arctic America, 29th May, 1864 (*MacFarlane*); *b*, ♂. Fort Yukon, Porcupine River (*Captain F. J. Page*); *c*, ♂. Fort Yukon, Arctic America, June 1862 (*J. Lockhart*); *d*, ♀. America; *e*. Fort Nescopce, Labrador (*H. Conolly*). Of these the first four (*a*, *b*, *c*, and *d*) are undoubtedly identical with the Norwegian Jer Falcon, the fifth (*e*) being the dark Labrador *F. labradorus* above referred to. Having a fair series of Jer Falcons in my possession, I made a critical comparison of the four American examples; and my notes, taken at the time, are as follows:—

Specimen *a*, an adult female, compared with a female of *F. gyrfalco* from Quickjock, Lapland. This specimen agrees so closely that I cannot trace the least difference either in coloration, measurements, or any thing else; and as the two skins are made up much alike, I could not well tell them apart, except by the labels. Mr. Blanford, who is working with me, is also unable to discern any difference.

Specimen *b*, a male, evidently adult, agrees closely with an old male from Lapland in my collection, but has the head darker and less streaked with white, and the back is also bluer than that of the Lapland specimen. Doubtless the American bird is the older of the two.

Specimen *c*, also a male, agrees tolerably well with my male bird from Lapland, but has the head darker.

Specimen *d*, a female, agrees very closely with a female from Lapland.

I have marked the specimens with which these American birds have been compared, and exhibit them herewith. Unfortunately the American specimens have been sent back, or else every one here present could have convinced himself of the specific identity of the two birds.

Mr. Ridgway evidently lacked the materials which have been at my disposal, or he would doubtless have arrived at precisely the same

conclusion as I have done. Indeed he writes (*l. c.*) as follows respecting the female from Fort Anderson:—"Upon comparing this specimen with the figures of a pair of var. *gyrfalco* by Wolf in Newton's 'Ootheca Wolleyana,' I can discover no difference at all"—thus showing that he only needed the necessary materials to convince himself of the identity of the American and European Jer Falcons.

It may be of some interest to ornithologists to know the result of some researches I have made to ascertain whether the bird described by Forster under the name of *F. sacer* is really the Jer Falcon, more especially as Forster was the first author subsequent to 1766 to use the name *sacer*; and his paper bears date 1772, being 16 years prior to Gmelin's Syst. Nat., in which the true Saker Falcon is described under the name of *F. sacer*.

Forster writes (Phil. Trans. lxii. p. 382, abridged edition p. 331) as follows:—"Speckled Partridge Hawk at Hudson's Bay. The name is derived from its feeding on the birds of the Grouse tribe, commonly called Partridges, at Hudson's Bay. Its irides are yellow and the legs blue. It comes nearest the Sacre of Brisson, Buffon, and Belon; but Buffon says it has black eyes, which is very indistinct, for the irides are black in none of the Falcons, and in few other birds; and the pupil, if he means that, is black in all birds. It is said by Belon to come from Tartary and Russia, and is therefore probably a northern bird. It is very voracious and bold, catching Partridges out of a covey which the Europeans are driving into their nests (? nets). It breeds in April and May. Its young are ready to fly in the middle of June. Its nests, as those of all other Falcons, are built in unfrequented places; therefore the author of the account from Severn river could not ascertain how many eggs it lays; however, the Indians told him it commonly laid two. It never migrates, and weighs  $2\frac{1}{2}$  pounds; its length is 22 inches, its breadth 3 feet."

From this it will be seen that it is most difficult to determine with any degree of certainty what the species is to which Forster refers. The yellow iris would point to an immature Goshawk; but that bird has not blue legs, and, doubtless, Forster would not have mistaken the Goshawk for the Saker. On the whole the probability is that the bird in question really was a Jer Falcon. The range of *F. gyrfalco* is, seeing that the American bird is identical with our European form, very extensive, as it is found from Scandinavia right across Asia into Arctic America, being, it would seem, replaced in Labrador by *F. labradorus*. The synonymy of this species I make rather different from that given by Mr. Sharpe (*l. c.*), and consider it should be as follows, viz.:—

#### FALCO GYRFALCO.

*Le Gerfault*, Briss. Orn. i. p. 370, pl. xxx. fig 2 (1760).

*Falco gyrfalco*, Linn. Syst. Nat. i. p. 130 (1766).

*Gerfault de Norwège*, D'Aubenton, Pl. Enl. pl. 462 (1770).

*Le Gerfault*, Buff. Hist. Nat. Ois. i. p. 239, pl. xiii. (1770).

? *Falco sacer*, J. Forster, Phil. Trans. lxii. p. 382 (1772).

? *American Sacre, Speckled Partridge Hawk*, Pennant, Arct. Zool. ii. p. 202. no. 96 (1785).

*Falco sacer*, var.  $\beta$ , Gmel. Syst. Nat. i. p. 273 (1788).

? *Falco cinereus*, id. Syst. Nat. i. p. 267 (1788).

*Le Tiercelet pagard du Gerfaut*, Schl. & Verst. Traité Fauc. pl. 7 (1853).

*Falco gyrofalco*, Thien. Abbild. Vögeleiern, Taf. li. figs. 3 a-d (1854).

*Hierofalco gyrfalco*, Bp. Rev. et Mag. de Zool. 1854, p. 536.

*Norway Falcon*, Salvin & Brod. Falconry, pl. xv. (1855).

*Falco norvegicus*, Tristr. Ibis, 1859, p. 24.

*Falco gyrfalco norvegicus*, Schl. Mus. P.-B. *Falcons*, p. 12 (1862).

I may here call attention to another Raptor first described by Forster, which Mr. Ridgway and Mr. Sharpe both seem to have referred to a wrong species, probably not having consulted the original description, as neither of them refers to Forster's paper. This bird is *F. spadiceus*, which Forster describes as follows:—"This species at first sight bears some resemblance to the European Moor Buzzard or *æruinosus*, Linn., but is much less, and wants the light spots on the head and shoulders."

This description cannot be fitted to agree with *Archibuteo sancti-johannis*, to which both Mr. Ridgway and Mr. Sharpe have referred *F. spadiceus* as a synonym; but the species to which Forster refers is undoubtedly *Circus hudsonius*, Linn., and therefore the following should be added to the synonymy of this latter species, viz. :—

*Falco spadiceus*, J. Forster, Phil. Trans. lxii. p. 382 (abr. ed. xiii. p. 331) (1771); Gmel. Syst. Nat. i. p. 273 (1788).

*Buteo spadiceus* (Forst.), Vieill. Ois. Am. Sept. i. p. 34 (1807).

And the two latter synonyms should be erased from the synonymy of *Archibuteo sancti-johannis*.

### 3. Monographic List of the Coleoptera of the Genus *Plusiotis* of America, north of Panama, with Descriptions of several new Species. By ADOLPHE BOUCARD, C.M.Z.S., &c.

[Received February 16, 1875.]

(Plate XXIII.)

*Plusiotis* is a genus of Coleopterous insects belonging to the true Rutelidæ—the second group of the ninth tribe of Scarabæidæ, according to Lacordaire.

It is properly placed by this eminent author between *Chalcoplethis* and *Chrysina*. I say *Chrysina* instead of *Chrysophora*, because the latter genus is more naturally placed after *Chrysina*.

It is very closely allied to the genus *Pelidnota*, from which it differs only in the mandibles being rounded outwardly, with the extremity obliquely truncated (see Plate XXIII. fig. 2) instead of being bidentated (as in fig. 1). Besides, the clypeus in *Pelidnota* is of variable form according to the sex, whilst in *Plusiotis* it is alike in both sexes.

The genus forms the passage between *Pelidnota* and *Chrysina*, and consists of a number of species of a splendid metallic colour.

They are exclusively American. One species, *P. læta* of Sturm (*amalia* of Burmeister), is said to be from Valparaiso; but I think the locality is doubtful, inasmuch as, from the descriptions of these authors, it seems to be only a variety of *P. adelaida*. All the other species are from Texas, Mexico, Guatemala, Costa Rica, and Panama; but very likely several species of this fine group may yet be met with in Columbia and Ecuador.

Having acquired lately three magnificent new species of this genus, one of which, *P. aurora*, has been in my private collection for two years past, I have considered the present moment very favourable for describing these new species, and at the same time drawing up a monographic list of all those previously described.

The species are excessively rare in collections, being found only occasionally in the countries they inhabit.

When travelling in the State of Oaxaca (Mexico) from 1857 to 1861, I discovered the two fine species *P. adelaida* and *P. victorina*.

In April 1858 I had the good fortune to discover the splendid *Chrysina adolphi*, Chev., in the neighbourhood of Tuquila, and on the 18th of May of the same year a fine new species of *Plusiotis*, which I call *lacordairei*. Although seventeen years have elapsed since its discovery, the species is still undescribed and has never been found by any other traveller.

These beautiful insects, although so brilliant in colour, are not easily found, because they pass the day, like the common European *Melolontha vulgaris*, devouring the leaves of trees, and are very difficult to be perceived among the foliage.

A little before sunset they fly about; and I have procured several specimens of *P. adelaida* attracted towards me by the light of a fire.

I have found *P. victorina* and *P. lacordairei* on the leaves of oaks, which they were devouring.

I have also found in the same manner *Chrysina adolphi* and its variety *C. mnizechii*. It is therefore on these trees that they must be searched for.

Being assimilated in colour to the foliage, they are very difficult of detection where present; and this must be one of the principal reasons why they are so seldom sent home by collectors.

The majority of those I have seen in collections were found dead on the road, and are consequently imperfect specimens.

By shaking young oaks, I have procured some specimens of *P. lacordairei*.

To be successful in finding these insects it requires to be at the proper place in the proper season, as they are very local species and live only a short time. The spring is the best time of the year to search for them. It is also necessary to have great patience, looking carefully in all directions on the oaks, principally on young trees when the leaves are coming out.

The following list comprehends all the species of this rare and beautiful genus.



## PLUSIOTIS RESPLENDENS, sp. n. (Plate XXIII. fig. 5.)

*P. resplendens*: *oblonga, valde convexa, supra aureo-metallica, capite punctato, oculorum margine interiore aureo-rubro, clypeo antice rotundato roseo-violaceo; thorace subtiliter punctulato; elytris aureis, nitidis, lævibus; infra roseo-argentea, tarsis aureo viridibus, antennis fuscis.* Length 1 inch.

Head strongly punctured; thorax nearly twice as long as it is broad, convex, the whole surface smooth; elytra convex, lightly striated with a burnished reddish gold margin, broader in the middle and rounded at the base. All the upper surface with the pygidium is of the most magnificent burnished pale gold, which will at once distinguish the species from any other. The underside is brassy silvery, less shining, with purplish reflections.

The only difference I can perceive between the male and the female is in the former being a little narrower and in the underside, which is more golden with greenish reflections.

*Hab.* Costa Rica.

I have two specimens of this magnificent insect, which were collected near San José.

## PLUSIOTIS AURORA, sp. n. (Plate XXIII. fig. 7.)

*P. aurora*: *supra roseo-metallica, oblongo-ovata, capite punctato, thorace subtiliter punctulato, margine rubro; elytris tenuiter punctatis, punctis in striis regulariter dispositis, margine rubro; infra igneo-rosea, tarsis rubro-metallicis, antennis fuscis.* Length 1 inch 2 lines.

The bright rose colouring with red margin will at once distinguish this species from its congeners.

The head is slightly punctured, rosaceous, with greenish reflections; the thorax is of the most magnificent metallic coppery rose-colour, as well as the elytra and the pygidium, and slightly punctured all over. In the elytra the punctuation is disposed in regular striæ; they are oblong, a little broader in the middle and rounded at the base. The underside is of the same colour as the head, with the same reflection. Tarsi metallic red, with black claws.

*Hab.* Veragua.

I have only one specimen of this very handsome insect, which was sent to me two years ago by one of my correspondents. Three months ago I received from the same country what I consider to be the female. It is exactly similar in shape and size; but the colour is totally different, being a kind of pale silvery green, with rose reflections.

However, I am in doubt about it, as I have just received from the same country another specimen equally similar but all green. Unfortunately this insect is not in a condition to be described, having lost a great part of its original colour on the elytra and thorax. I shall wait until more specimens arrive to decide the question.

## PLUSIOTIS BATESI, sp. n. (Plate XXIII. fig. 6.)

*P. batesii*: *oblonga, valde convexa, supra aureo-pallida splendida,*

*capite aureo, margine anteriore rufo, parce punctulato; thorace elytrisque aureo-pallidis subtiliter punctulatis, elytris leviter striatis, pygidio rufo; infra rufa violaceo micans, tarsis cupreis, antennis fuscis.* Length 1 inch 3 lines.

Head, thorax, and elytra of a very pale burnished gold-colour, very slightly punctured, the anterior margin of the head rufous; elytra slightly striated, of about the same length as those of *P. aurora*, but a little broader; pygidium rufous. The underside also rufous, with red and purple reflections; tarsi of a coppery colour, with the claws nearly black, antennæ pitchy.

*Hab.* Costa Rica.

I have only one specimen of this very fine insect, which was collected by an American geologist, Professor Gabb.

I dedicate this fine species to my esteemed friend Mr. H. W. Bates, the celebrated naturalist traveller, in honour of his numerous discoveries on the Amazons, and his important works on entomology.

#### *PLUSIOTIS CHRYSARGYREA.*

*Pelidnota chrysargyrea*, Sallé, Annales de la Soc. Ent. de France, tome iv. p. 362.

This very handsome species comes close to *P. batesii*, from which it differs chiefly in the colour, which is still more brilliantly metallic, and also in a broad rosy margin on each side of the thorax; the legs and tarsi also differ in colour, being green with blue claws.

My friend M. Auguste Sallé has recently published a diagnosis of this species in the Bulletin of the Entomological Society of France for the 12th of August 1874. He has two specimens, which were brought over from Costa Rica by Dr. van Patten. M. Sallé says that one of them is in colour just like quicksilver, and the other golden. I have compared these specimens with *P. resplendens* and *P. batesii*, from which they totally differ, although these last-named species are also golden. These three species, with *P. aurora*, are among the most magnificent insects yet discovered; and it is very probable that many more remain to be detected in Central America.

As my esteemed friend M. Sallé says he intends to give a full description of this species, it is useless for me to do so, as he is better able than myself to do justice to the subject; but I hope he will agree with me in placing this insect among the *Plusiotides*, as it has the characters by which this genus is distinguished from *Pelidnota*. Although these characters are slight, they seem to be constant. I think there are only three specimens of this fine insect known: two are in the collection of M. Sallé; and the other one is probably in Germany. I say this because I know for certain that Dr. van Patten had three specimens when he left London for Germany in 1872.

This species is one of my desiderata.

*PLUSIOTIS MARGINATA*, Waterh. Ent. Month. Magaz. 1871, vol. viii. p. 5.

*P. marginata: oblongo-ovata, minus convexa, supra prasina, infra*

*argenteo-viridis, elytris lævibus margine lato argenteo-splendido, tibiis et tarsis aureis, antennis piceis.* Length 11 lines.  
*Hab.* Chiriqui (Veragua).

This species has been well described by Mr. Charles Waterhouse in the 'Entomologists' Monthly Magazine' for June 1871. The type is in the collection of the British Museum. Besides, another specimen of this charming species is in the collection of Mr. H. W. Bates. My description was taken from this specimen.

It is one of my desiderata.

PLUSIOTIS ADELAIDA, Hope, Proc. Ent. Soc. 1840, p. 11.

*Plusiotis ornatissima*, Sturm, Cat. 1843, p. 341, t. 3. f. 7.

*P. adelaida: oblongo-ovata, capite thoraceque viridibus, margine aurato; elytris viridibus, lineis argentatis; infra viridi-ænea, tibiis cupreis, tarsis cupreo-metallicis, antennis rufis.* Length 1 inch 2 lines to 1 inch 4 lines.

There is a fine variety of this species, with the head and the thorax green, with rufous lines, the elytra rufous with silvery lines and gold margin. This variety has been described by Sturm as *ornatissima*.

I met with this fine insect at La Parada, near Oaxaca (Mexico), during the year 1858. It used to fly about at sunset; and I was able to catch several specimens by running after them with a butterfly-net. May and June are the months when there is some chance of meeting with this insect.

As La Parada is a very mountainous country, covered with pines and oaks, it is very probable that it feeds on the leaves of these trees.

My colleague (of the Commission Scientifique du Mexique), M. Bocourt, has found a certain number of this species in Guatemala.

It is in the collections of the Jardin des Plantes of Paris, of the British Museum, MM. Mnizech, Sallé, Bates, &c.

PLUSIOTIS LÆTA, Sturm, Cat. 1843, p. 341.

*Plusiotis amalia*, Burm. Handb. iv. p. 422.

*P. læta: viridi-prasina, pedibus subauratis, tarsis æneis nitidioribus; elytris costatis, interstitiis latioribus, punctatis.* Length 1 inch.

This species is very closely allied to *P. adelaida*, from which (according to the description of Sturm) the only difference to be observed is in the colour of the tarsi, which are of a shining brassy green instead of metallic coppery. It is said to be from Valparaiso; but I believe this to be very doubtful, and, unhappily, I have not been able to see the species.

PLUSIOTIS GLORIOSA, Lec. Proc. Ac. Phil. 1854, p. 221.

*P. gloriosa: supra læte psittacina; clypeo punctulato, margine subtili elevato aureo; thorace aureo punctulato, margine laterali vitisque quatuor impressis splendide aureis, nitidissimis, interstitiis 2º et 3º foveis inauratis confluentibus vittam parvam simulanti-*

*bus ornatis; subtus aureo-viridis, commissuris omnibus aureis.*  
Length 1 inch 2 lines.

*Hab.* Texas.

The only specimen known of this species is the type belonging to the Museum of Philadelphia. I had the pleasure of seeing it in London last year, Dr. Horn having had the good idea to bring this insect with him on his journey to Europe.

It is a very good species, totally different from any other. It was collected at "Copper-mines" in 1850 by Mr. Thomas H. Webb, M.D. It is also one of my desiderata.

PLUSIOTIS LACORDAIREI, sp. n. (Plate XXIII. fig. 4.)

*P. lacordairei: oblonga, parallela, valde convexa, supra viridi-argentea roseo tincta; capite rufo, medio viridi, tenuiter punctulato; thorace subtiliter punctulato, margine cupreo micante; elytris tenuiter punctatis, punctis in striis profundis regulariter dispositis, margine cupreo micante, callo apicali fortiter elevato; infra viridi-argentea, tibiis rufis, tarsis cupreo-aureis, antennis fuscis.* Length  $11\frac{1}{2}$  lines.

The silvery green colour of this insect will easily distinguish it from any other; the head is coppery rufous, with the centre green; the thorax and the elytra are slightly punctured. In the latter the punctuation is disposed in regular striæ. They have a brilliant coppery lateral margin and suture; the scutellum is also coppery; the tibiæ are red, with purple reflections, the tarsi coppery metallic, and the antennæ rufous. The upper and the under surfaces are of the most beautiful silvery green, with reddish reflections.

*Hab.* Tuquila (Mexico).

I have only one specimen of this fine species, which is also in the collections of MM. de Mnizech, Thomson, and Sallé.

All the specimens were collected by me in April and May of 1858 on young oaks, on which it feeds.

I dedicate this fine species to the memory of the late celebrated Professor T. Lacordaire, in honour of his magnificent work on Coleoptera, commonly called Lacordaire's 'Genera.' I have heard from my friends Dr. Candèze and others that he was so enthusiastic and worked so hard in the preparation of his last volumes, that it must have hastened his death, which took place on the 18th of July, 1870, at the age of sixty-nine years and four months, leaving the 'Genera' not quite finished. Happily Dr. Chapuis, his disciple and friend, has undertaken the conclusion of this gigantic work.

PLUSIOTIS AURIPES.

*Chrysina auripes*, Gray, Anim. Kingd. t. 14, p. 517.

*P. auripes: oblongo-ovata, capite tenuiter punctato, supra viridi obscura; elytris punctatis, punctis in striis regulariter dispositis; tibiis aureis, tarsis aureo-viridibus, antennis fuscis.* Length 1 inch to 1 inch 2 lines.

*Hab.* Mexico.

I have two specimens of this very rare species, one of which is the original type from which Mr. Gray took his short description.

PLUSIOTIS PSITTACINA, Sturm, Cat. 1843, p. 340, t. 3. f. 6.

*P. psittacina*: *oblongo-ovata, supra viridi-prasina, fortiter punctulata; tibiis rufis violaceo-micantibus, tarsis aureis*. Length 1 inch 4 lines.

This species has been considered by MM. Gemminger and Harold to be identical with *P. auripes*; but, having the typical specimen of the latter in my possession, and having examined attentively along with Mr. Charles Waterhouse the specimen in the collection of the British Museum under the name of *psittacina*, Sturm, which specimen has still the label of Mr. Sturm's own handwriting, we have come to the conclusion that it is altogether a good species, different from *P. auripes*, Gray. The elytra are much more punctuated, the colour is apple-green all over instead of a dark green, and the tibiæ are rufous; with purple reflections; it is also much longer, being 1 inch 4 lines in length.

PLUSIOTIS COSTATA, Blanch. Cat. Coll. Ent. 1850, p. 210.

*P. costata*: *oblonga, convexa, supra viridis, capite fortiter punctulato; thorace subtiliter punctulato, margine aureo-micanti; elytris punctatis, punctis in striis regulariter dispositis, tibiis tarsisque aureo-viridibus, antennis rufis*. Length 1 inch 2 lines to 1 inch 5 lines.

*Hab.* Mexico.

This handsome species was described by Professor Blanchard on a red specimen which must be considered really only a variety of the species. His description is nearly the same as the above; but, instead of being green, the head, thorax, elytra, tibiæ, and tarsi are described as of a brilliant red coppery colour. There is also a variety of the same red coppery colour, but darker, with purple reflections.

I have a very fine series of this species with its varieties. Specimens are also in the collections of the British Museum, Jardin des Plantes, Mnizech, and Sallé.

PLUSIOTIS SALLÆI, sp. n. (Plate XXIII. fig. 3.)

*P. sallæi*: *ovata, convexa, supra viridis; capite crebre punctulato; thorace subtiliter punctulato, margine cupreo-pallido, scutello lævi; elytris punctatis, punctis in striis regulariter dispositis; infra viridis, femoribus viridibus, tibiis, tarsis, antennisque rufis violaceo tinctis*. Length 1 inch 1 line.

Head green, strongly punctured; thorax green, slightly punctured, with a broad pale coppery margin on each side, which distinguishes at once this species from *P. auripes* and *P. costata*. Elytra punctured, the punctures disposed in regular striæ; tibiæ, tarsi, and antennæ rufous, with a purplish reflection.

*Hab.* Mexico.

I have only one specimen of this rare species, which was taken in the neighbourhood of Orizaba.

I have the greatest pleasure in dedicating this species to my intimate friend M. Auguste Sallé, in honour of his numerous entomological discoveries in St. Domingo, Central America, Mexico, &c.

PLUSIOTIS LANIVENTRIS, Sturm, *l. c.* p. 339, t. 3. f. 5.

*P. laniventris*: *oblonga, ovata, supra læte viridis; capite, thorace elytrisque crebre punctulatis, margine cupreo-micanti; infra viridi-aurata, tibiis tarsisque aureis, antennis rufis.* Length 1 inch 3 lines.

In Dr. Gemminger and B. de Harold's 'Catalogus Coleopterum,' *P. latipennis* of Sturm and *P. serena* of Klug are regarded as synonyms of this species.

I have two specimens of this rare insect, which is also in the collections of MM. de Mnizech and Sallé.

\* PLUSIOTIS MNIZECHII, sp. n.

*P. mnizechii*: *oblonga, convexa, supra læte viridis, capite punctato, oculorum margine interiore aureo, clypeo antice rotundato roseo-violaceo; thorace crebre punctulato, margine aureo; elytris fortiter punctulatis, margine aureo-micanti, scutello cupreo; infra viridi-cuprea; femoribus, tibiis tarsisque aureis, antennis fuscis.* Length 1 inch 4 lines.

Head, thorax, and elytra strongly punctured, with a brilliant gold margin and suture; clypeus rufous, with purple reflections; thorax, elytra, and pygidium golden green; scutellum coppery, underside copperish green; legs, tibiæ, and tarsi golden; antennæ rufous.

*Hab.* Mexico.

I have two specimens of this handsome species; and I have seen two others in the British Museum which seem to be similar. I do not know of any other specimen.

I dedicate this fine insect to my honourable friend Count Georges de Mnizech, in honour of the magnificent collection of Coleoptera which he has managed to form by his great passion for entomology and his liberality.

PLUSIOTIS VICTORINA, Hope, Proc. Ent. Soc. 1840, p. 11.

*P. victorina*: *capite thoraceque profunde punctatis cupreo-rufis; elytris fortiter punctatis, splendide viridi-aureis, lineis macularibus rufis, margine cupreo; infra cupreo-rufa, tarsis nigris, antennis fuscis.* Length 1 inch 4 lines.

In the collections of the British Museum, Jardin des Plantes, Mnizech, Sallé, Bates, Candèze. I have three specimens of this magnificent species, which comes very close to the genus *Chrysina* from its large size and its general appearance. This is why I have placed this species the last of all; and for the same reason I began my list with *P. resplendens*, which is the species most closely allied to *Pelidnota*. They form natural links between these two genera.

I found *P. victorina* for the first time on the 8th of May, 1857, on the road from Tepanzacualco to Istlan, about fifty miles from Oaxaca. They were devouring the young leaves of oak trees.

I sent the three specimens which I collected on that day to my friend M. Sallé, who wrote to me immediately that they were very fine insects, and very rare in collections. In consequence of this information I went again to Tepanzacualco in May 1860, but could find only two more specimens.

In July of the same year I was on my way to the Atlantic coast for change of air (being very ill of pleurisy), when I saw one of these insects near Talea, not far away from Tepanzacualco. I could not resist the temptation to search for them, and was so fortunate as to collect about twelve. At the same time I found also several specimens of a new *Golofa*, described some time after by Mr. James Thomson as *Golofa imperator*.

*P. victorina* is more easily found than the other species from its more conspicuous appearance, the difference in colour between its head and thorax and its elytra being very striking.

#### List of the Species.

- |   |   |
|---|---|
| 1. <i>Plusiotis resplendens</i> , p. 119. | 9. <i>Plusiotis lacordairei</i> , p. 122. |
| 2. — <i>aurora</i> , p. 119.              | 10. — <i>auripes</i> , p. 122.            |
| 3. — <i>batesi</i> , p. 119.              | 11. — <i>psittacina</i> , p. 123.         |
| 4. — <i>chrysargyrea</i> , p. 120.        | 12. — <i>costata</i> , p. 123.            |
| 5. — <i>marginata</i> , p. 120.           | 13. — <i>salléi</i> , p. 123.             |
| 6. — <i>adelaida</i> , p. 121.            | 14. — <i>laniventris</i> , p. 124.        |
| 7. — <i>læta</i> , p. 121.                | 15. — <i>mnizechii</i> , p. 124.          |
| 8. — <i>gloriosa</i> , p. 121.            | 16. — <i>victorina</i> , p. 124.          |

#### EXPLANATION OF PLATE XXIII.

- Fig. 1. Mandible of *Pelidnota*.  
 2. Mandible of *Plusiotis*.  
 3. *Plusiotis salléi*, p. 123.  
 4. — *lacordairei*, p. 122.

- Fig. 5. *Plusiotis resplendens*, p. 119.  
 6. — *batesi*, p. 119.  
 7. — *aurora*, p. 119.

#### 4. Descriptions of ten new Species of Shells.

By G. B. SOWERBY, Jun.

[Received February 23, 1875.]

#### (Plate XXIV.)

##### 1. *CONUS GRACILIS*, n. sp. (Plate XXIV. fig. 6.)

*C. testa elongata, basin versus multo attenuata, superne subangulata, fusca, maculis albidis irregulariter aspersa, undique transversim sulcata, sulcis angustis, subdistantibus, crenulatis; spira elata, subgradata, acutiuscula; apice papillari; anfractibus 9, superne concavis, crenato-bisulcatis; apertura angusta.*

Long. 31, maj. diam. 10, min. 2 mill.; spira alt. 8 mill.; apert. long. 23, maj. lat. 2, min.  $1\frac{1}{2}$  mill.

An elongated Cone, much attenuated towards the base, obtusely

angled at the upper part; of a darkish brown colour, with an irregular sprinkling of whitish patches; transversely grooved throughout, grooves narrow, rather distant, crenulated; spire elevated, rather acute; apex papillary; whorls 9, concave above, with two crenulated grooves; aperture narrow.

Specimen unique, in the collection of Dr. Prevost.

*Obs.* This very elegant new shell resembles in form *C. aculeiformis* (Reeve), *orbigny* (Audouin), &c., but in sculpture and style of painting it is quite different from the shells of that group; its surface, between the grooves, has a smooth and shining appearance, though beneath the lens very fine longitudinal and transverse striæ may be discerned. As in most Cones, the grooves are much closer, deeper, and more strongly crenulated towards the base than at the upper part of the body-whorl; while the two grooves round the whorls of the spire are about equal to those of the base. The colouring, though simple, is not common in Cones, and quite unknown in its congeners in form—the rich brown colouring almost covering the shell, relieved by a few irregularly placed whitish patches.

## 2. CONUS MULTILINEATUS. (Plate XXIV. fig. 5.)

*C. testa turbinata, flavescenti-fusca, lineis fuscis punctatis multicingulata, zona lutescente subcentrali balteata, basin versus paulo attenuata, valide costata, superne angulata, lævi; spira concavo-acuminata, tuberculis parvis coronata, inter tuberculas brunneo maculatu; anfractibus 9, planato-concavis.*

Long. 40, maj. lat. 20, min. 5 mill.; spira alt. 8 mill.; apert. long. 32, maj. lat.  $4\frac{1}{2}$ , min. 3 mill.

A turbinated Cone, of rather solid structure, yellowish brown colour, encircled with numerous fine brown dotted lines and a sub-central belt of pale yellow, somewhat attenuated towards the base, where it is strongly ridged; smooth at the upper part, and angled; spire rather concavely acuminate, coronated with small tubercles, which are made conspicuous by intermediate brown blotches; whorls 9 in number.

Specimen unique, in the collection of Dr. Prevost.

*Obs.* The species most like this in marking is *C. lignarius* (Reeve), from which, however, it may very readily be distinguished, both by its turbinated form and the coronation of the spire. Finding this species so like *C. lignarius* in colour and markings, I have been led to examine a large number of specimens of that species; and I find them remarkably uniform, with scarcely any tendency to variation, of an oblong, almost cylindrical form, without any sign of nodules on the spire.

## 3. TROCHUS (POLYODONTA) MIRABILIS. (Plate XXIV. fig. 7.)

*T. testa conica, solidiuscula, corneo-albida rufo-fusco flammulata; anfractibus 10, planato-convexis, ad suturam profunde excavatis, spiraliter costis rugoso-granulatis valde cingulatis, interstitiis profundis, plicatis; spira acuta; basi convexuscula, granuloso-*



*costata, late excavata, supra columellam profunde umbilicata; apertura subquadrata, intus lirata; columella noduloso-plicata.*

Alt. 40, maj. lat. 30 mill.

*Hab.* Moluccas.

A *Trachus* (section *Polydonta*), rather solid, fleshy white, with longitudinal reddish brown flames; whorls 10 in number, flatly convex, deeply excavated at the suture, encircled spirally with strong granular ribs, between which the interstices are deep and plicated; spire acute; base rather convex, with rather a broad excavation, and a deep umbilicus above the columella; aperture nearly square, ridged within; columella furnished with nodulous plaits.

*Obs.* A very beautiful species, of striking character. The only other specimen of it that I have seen is a smaller one, which Miss E. Farre presented to the British Museum, in the early part of the year 1871. The roughly granular ribs and the deeply excavated suture are its chief characters.

#### 4. ZIZIPHINUS MULTILIRATUS. (Plate XXIV. fig. 10.)

*T. testa abbreviato-conica, flavescenti-viridula, rufo flammulata; anfractibus 7, convexis, obsolete biangulatis, spiraliter crebre grano-liratis; basi convexa; apertura subcirculari; columella lævi, callosa, subarcuata; labio externo tenui, simplici.*

Maj. diam. 18, alt. 17 mill.; apert. diam. 9 mill.

*Hab.* Cape of Good Hope.

An abbreviately conical *Ziziphinus*, of a yellowish-green colour, with red flames; whorls 7 in number, convex with two very slight angles, spirally closely encircled with granular ridges; base convex; aperture nearly circular; columella smooth, callous, slightly arched; outer lip simple and thin.

Var.  $\beta$ . *Costis rufo-articulatis, vix granosis* (Plate XXIV. fig. 11).

In this variety, though evidently not specifically distinct, the ridges are nearly smooth, and only a slight tendency to granulation may be observed on the upper part of the whorls.

#### 5. MITRA FLEXILABRIS. (Plate XXIV. fig. 4.)

*M. testa pyramidata, lutea, aurantiaco bizonata, polita, transversim obsolete striata; spira subobtusè acuminata; basi leviter contracta; anfractibus 6, plano-convexis; apertura elongata, superne attenuata; columella quinqueplicata; labio externo simplici, superne inflecto; intus lævi.*

Long. 13, maj. lat. 4; anfr. ult. maj. long. 9; apert. long. 7, maj. lat.  $1\frac{1}{2}$ , min.  $\frac{1}{3}$  mill.

A small pyramidal *Mitra*, of a pale yellow colour with two orange zones, smooth, very faintly striated spirally; spire rather obtusely acuminate; base slightly contracted; whorls 6, flatly convex; aperture long, attenuated above; columella five-plaited; outer lip simple, inflected above; interior smooth.

*Hab.* Mauritius.

Specimen from the collection of Dr. Prevost.

## 6. MITRA INDUTA. (Plate XXIV. fig. 9.)

*M. testa acuminato-fusiformi, epidermide atro-fusca induta, laevigata, obsolete striata, basin versus valide sulcata; spira acuta; basi leviter attenuata; anfractibus 9, subrotundatis; apertura oblonga, carnea; columella rectiuscula, triplicata; labio externo arcuato, tenui, minutissime crenulato; intus laevi.*

Long. 33, maj. lat. 11; anfr. ult. maj. long. 21; apert. long. 16, lat. 4 mill.

An acuminately fusiform *Mitra*, covered with a dark brown epidermis, nearly smooth, very obscurely striated, but strongly grooved towards the base; spire acute; base somewhat attenuated; whorls 9 in number, rather rounded; aperture oblong, flesh-colour; columella nearly straight, three-plaited; outer lip arched, thin, very minutely crenulated; interior smooth.

*Obs.* A species quite distinct from any hitherto described; it makes an addition to the *Mitræ* with dark epidermis, such as *M. orientalis*, *nigra*, &c.

## 7. OVULUM DEPRESSUM. (Plate XXIV. fig. 1.)

*O. testa elongata, angustata, depressa, antice producta, utrinque attenuata et bicuspidata, polita, minutissime striata, alba, extremitatibus aurantiaco tinctis; basi concavo-depressa; apertura angusta, postice dilatata.*

Long. 21, maj. diam. 5, min. 2 mill.

*Hab.* North-west Australia (*Capt. Denicke*).

A narrow depressed *Ovulum*, produced in front, both ends attenuated and terminating in two points, polished, very finely striated, white, tinged with orange at the extremities; base concavely depressed; aperture narrow, rather more open towards the hinder part.

## 8. ADMETE TABULATA. (Plate XXIV. fig. 3.)

*A. testa oblongo-turrita, spiraliter costata (costis planato-concavis), longitudinaliter obscure plicata, albida, epidermide pallide fuscescente induta; anfractibus 7, convexis, superne angulatis, supra angulum subconcavo-depressis; apertura oblongo-ovata; columella rectiuscula, minute plicata.*

Long. 22, maj. lat. 10 mill., apert. long. 9, lat.  $4\frac{1}{2}$  mill.

*Hab.* Arctic Ocean.

An *Admete* of an oblong turreted form, spirally ribbed, ribs slightly concave; longitudinally obscurely plicated; whitish, covered with a pale brown epidermis; whorls 7 in number, convex, angled above, concavely depressed above the angle; aperture oblong-ovate; columella nearly straight, minutely plicated.

*Obs.* The species of the genus *Admete* (Möller), by some included in *Cancellaria*, are all northern; the type is *A. viridula* (Gould); and the species at present known are *A. crispa* (Möller), *couthoyi* (Jay), *grandis* (Forbes), *abnormis* (Gray), *borealis* (A. Adams), and *ciliata* (Krüger).

9. *LATIRUS AUREO-CINCTUS*. (Plate XXIV. fig. 2.)

*L. testa elongato-turrita; spira obtuso-acuminata; basi multo contracta; anfractibus 9, rotundatis, spiraliter liris, longitudinaliter costatis, costis latis rotundatis, liris aureo-flavis, interstitiis atro-fuscis, filo-striatis, striis albidis; apertura ovata, parva; columella triplicata; labio externo crenulato; canali brevi, rectiuscula.*

Long. 20, lat. 8; apert. long. 5, lat.  $2\frac{1}{2}$  mill.

*Hab.* Mauritius.

An elongately turreted shell; spire obtusely acuminate; base much contracted; whorls 9 in number, rounded, spirally ridged, longitudinally ribbed; ribs broad, rounded; ridges of a golden yellow colour; interstices nearly black, with fine whitish threads; aperture ovate, small; columella three-plaited; outer lip crenulated; canal short, nearly straight.

*Obs.* This remarkable little shell I received about two years ago from M. de Robillard of Mauritius; but I believe it has never been described. There is no known species with which it can well be compared.

10. *MYODORA ROTUNDATA*. (Plate XXIV. fig. 8.)

*M. testa rotundato-subtrigona, valde inæquivalvi, albida, utrinque concentricè valde striata; latere postico leviter biangulato; margine dorsali excavato, vix incurvato; umbonibus acutis, cæruleo tinctis; valva dextra valde ventricosa, postice bicostata; valva sinistra planata; fovea trigona ligamenti parviuscula.*

Lat. 25, alt. 23 mill.

*Hab.* New Zealand.

A *Myodora* of a rounded form, very inæquivalve, both valves concentrically strongly striated, with two slight angles on the posterior side; dorsal margin excavated, scarcely incurved; umbones acute, of a bluish tint; right valve very ventricose, with two ribs from the umbones to the posterior margin; left valves flat; triangular ligamentary pit rather small.

*Obs.* Four specimens of this species having come into my hands, I have compared them with a number of specimens of *M. striata*, and find them to differ in these respects—*M. rotundata*, right valve much deeper, umbones more central, dorsal margin less incurved and more sloping, ligamentary pit much smaller, and the whole shell rounder.

## EXPLANATION OF PLATE XXIV.

Fig. 1. *Ovulum depressum*, p. 128.

2. *Latirus aureo-cinctus*, p. 129.

3. *Admete tabulata*, p. 128.

4. *Mitra flexilabris*, p. 127.

5. *Conus multilineatus*, p. 126.

6. — *gracilis*, p. 125.

7. *Trochus (Polydonta) mirabilis*, p. 126.

Fig. 8 a, b. *Myodora rotundata*, p. 129.

9. *Mitra induta*, p. 128.

10. *Ziziphinus multiliratus*, p. 127.

11. — — —, var.  $\beta$ .

5. On some Spiders from New Caledonia, Madagascar, and Réunion. By T. THORELL.

[Received February 24, 1875.]

(Plate XXV.)

Some considerable time ago I received from Dr. Aug. Vinson, the celebrated author of 'Aranéides des îles de la Réunion, Maurice et Madagascar,' 'Voyage à Madagascar au couronnement de Radama II.,' &c., a little collection of Spiders, partly from New Caledonia and partly from Madagascar and Réunion, among which were a few new species which Dr. Vinson requested me on a fitting opportunity to describe. The collection was accompanied by beautiful figures of some of the species sent, executed by Dr. Vinson himself, and by various interesting notices relative to their habits, which Dr. Vinson obligingly placed at my disposal. Hindrances, which it was not in my power to avoid, have prevented my executing the commission thus received as early as I could have wished. Having, however, now obtained leisure for the purpose, I have not confined myself to describing those species only which appear to me to be new, accompanied by the figures I have received from Dr. Vinson, but I have also added more or less detailed descriptive notices of the other previously known species. Dr. Vinson's work, 'Aran. des Îles de la Réunion &c.,' has, as is generally known, met with a large and universal approval, and is justly considered one of the most valuable works treating on this interesting group of animals, especially on account of the numerous and important observations it contains relative to the habits and instincts of the species described. The species of which he has treated have, through these observations as well as through Dr. Vinson's descriptions and figures made directly from living specimens, become of the greatest interest to European arachnologists, who are seldom able to learn more about the life of extra-European Spiders than the name of the country where they are met with, or to see other than more or less faded specimens preserved in spirit. Having now had the good fortune to receive original specimens of some of Dr. Vinson's species, I consider myself bound to avail myself of this opportunity to indicate the changes of colour that some of them undergo when (as is the case with the specimens I have received from Dr. Vinson) they have lain some considerable time in spirit, as also to make some additions to Dr. Vinson's descriptions, and thus to offer a little contribution to our knowledge of these Spiders.

The species in question are as follows:—

*NEPHILA LABILLARDIERII*, n. sp. (Plate XXV. figs. 1, 2.)

*Cephalothorace paullo brevior quam tibia cum patella quarti paris, nigro, bituberculato, pube densa subargentea tecto; sterno tuberculo magno nigro pone labium instructo, tuberculis lateralibus eo minoribus, rufescentibus; oculis lateralibus spatio diametro sua plus duplo majore disjunctis; pedibus obscure testaceo-fuscis,*

apice late nigris, pube tenui pallida et pilis nigris tectis, tibiis quarti paris subter paullo longius et densius nigro-pilosis; abdomine subelliptico, circiter dimidio longiore quam latiore, fusco, subargenteo-piloso, pictura in dorso et in ventre distincta vix ulla.

♀ ad. Long. circa 25 millim.

Var. β. Abdomine supra pallido, testaceo-cinereo.

1799. *Aranea edulis*, Labill. Relation du voyage à la recherche de La Pérouse, ii. p. 240, pl. xii. fig. 4 (ad partem).

1841. *Epeïra edulis*, Walck. H. N. d. Ins. Apt. ii. p. 93 (ad partem).

Fœmina. *Cephalothorax* circa  $10\frac{1}{2}$  millim. longus, 8 millim. latus, paullo brevior quam patella cum tibia quarti paris, patellam cum tibia tertii paris longitudine æquans, longitudinem tibiæ quarti paris latitudine non æquans, frontis latit.  $5\frac{1}{2}$  millim., lateribus partis thoracicæ æqualiter rotundatis, partis cephalicæ lateribus rotundatis quoque, hac parte postice tuberculis duobus fortioribus armata, a latere visa elevato-arcuata, primum (ad tubercula) fortius, tum levius adscendenti, ad oculos vero denique paullo arcuato-proclivi; niger, nitidus, pilis argenteis dense tectus, præter postice hic illic ita detritus, ut ad latera et pone oculos nigris maculis notatus videatur. Tuberculum oculorum mediorum humile, lateralium altius, costam latam, obliquam, duplo longiorem quam latiore, antice præruptam formans. Oculi medii, spatiis diametro oculi circa triplo majoribus disjuncti, in quadratum dispositi, æquales fere; laterales oculi, iis evidenter minores et subæquales, spatium oculi diametro vix triplo majore inter se remoti; antici eorum plus duplo longius ab anticis mediis quam hi inter se distant; spatium inter oculos medios anticos et marginem clypei paullo majus quam inter eos et medios oculos posticos. Mandibulæ circa  $4\frac{1}{2}$  millim. longæ, tibiis tertii paris longitudine æquantes, longiores quam patellæ et tarsi (primi paris tarsis exceptis, qui mandibulas longitudine æquant), duplo fere longiores quam latiores basi, in dorso ad basin geniculato-connexæ, tum rectæ, subcylindratae, apice intus oblique truncato-angustatae, nigrae, nitidae, nigro-pilosæ et -setosæ. Sulcus unguicularis antice dentibus trinis armatus, quorum medius reliquis major est, postice dentibus 4. Unguis niger. Maxillæ et labium nigra, illæ apice intus anguste pallidæ; labium non antice elevato-marginatum. Palpi nigri, nigro-pilosi, basi subter pube densa subargentea tecti. Pedes longi, graciles valde, præsertim postici: quarti paris femora in medio vix crassiora sunt quam palporum pars patellaris; femora et tibiæ apice vix vel parum incrassata; obscure testaceo-vel ferrugineo-fusci, apice late nigri (metatarsis ad maximam partem et tarsis nigris), coxis nigriscentibus; pube tenui pallida præsertim in femoribus tecti, hac pube præsertim subter evidenti; nigro-pilosi, tibiis quarti paris subter paullo densius et longius nigro-pilosis. Aculei pedum parvi et debiles, sat rari in femoribus; aculei pauci supra in tibiis primi paris

*secundum totam longitudinem earum dispositi, non ad apicem tantum. Pedes primi paris cephalothorace circa  $5\frac{3}{4}$  longiores : in exemplo, cujus cephalothorax  $10\frac{1}{2}$  millim. longus est, pedes primi paris 60 (patella  $3\frac{1}{2}$ , tibia 14, metatarsus 20, tarsus  $4\frac{1}{2}$ ), secundi paris 49, tertii  $25\frac{1}{2}$ , quarti paris 43 (patella  $3\frac{1}{4}$ , tibia  $8\frac{1}{2}$ ) millim. longi. Abdomen cylindrato-ovatum, circiter dimidio longius quam latius, supra fuscum, pube brevi subargentea minus dense vestitum, pictura distincta nulla (an ita in vivis quoque?); venter obscurior, subtestaceo-fuliginosus, scutis pulmonalibus nigro-fuscis, intus sulcis transversis brevibus profundis inæqualibus dense exaratis. Vulva ex area nigra transversa cornea constat, quæ antice costa recurva limitatur, postice vero, in medio (ad ipsam rimam genitalem), costa brevior, compressa, recta, acuta; utrinque hæc area inæqualis foveam majorem oblongam parum profundam ostendit.*

*Mas ignotus.*

*Var. β. Differt abdomine supra pallidior, testaceo-cinereo, et paullo brevior, magis elliptico (long. ejus  $12\frac{1}{2}$ , lat.  $9\frac{1}{2}$  millim.); pedes in exemplo unico a me viso paullo breviores sunt quoque quam in forma principali, femoribus basi nigricantibus; primi paris cephalothorace tantum  $5\frac{1}{4}$  longiores. Long. corporis 22, cephaloth. 10, lat. ejus  $7\frac{1}{4}$ , lat. frontis  $5\frac{1}{4}$ , pedes primi paris 52 (patella  $3\frac{1}{2}$ , tibia 12), secundi paris 44, tertii  $23\frac{1}{2}$ , quarti 40 millim. longi; patella quarti paris  $2\frac{3}{4}$ , tibia 8 millim.*

*Patria. Nova Caledonia. Duas fœminas adultas, a cel. Vinson ad me missas, vidi.*

This species is no doubt comprised by Labillardière, together with the next following, under the name of *Aranea edulis*; but as his description of the abdomen better suits that species, I have retained for it the specific name *edulis* (Lab.).

#### NEPHILA EDULIS (Labill.).

*Cephalothorace tibiam cum patella quarti paris longitudine æquante, nigro, bituberculato, dense argenteo-villoso, sterno tuberculo pone labium carente, tuberculis lateralibus humillimis, cum limbo antico rufescentibus; oculis lateralibus spatio diametro sua plus duplo majore disjunctis, pedibus rufescenti-fuscis, apice late nigris, subargenteo-pubescentibus, nigro-pilosis, apice femorum et tibia-rum pedum anticorum inferius et tibiis quarti paris totis pilis nigris paullo longioribus et densioribus subhirsutis; abdomine fusco, fere duplo longiore quam latiore, plaga vel fasciâ transversa pallidior in dorso antice notato et pube argentea tecto.*

♀ ad. Long. circa 20 millim.

1799. *Aranea edulis*, Labill. Rel. du voy. à la recherche de La Pérouse, ii. p. 240, pl. xii. fig. 4 (salt. ad part.).

1841. *Epeïra edulis*, Walck. H. N. d. Ins. Apt. ii. p. 93 (salt. ad part.).

*Fœmina. Cephalothorax  $8\frac{3}{4}$  millim. longus,  $6\frac{1}{4}$  millim. latus, patellam cum tibia quarti paris longitudine æquans, latitudine longitudinem*

tibiæ ejusdem paris æquans saltem, frontis latitudine  $4\frac{1}{2}$  millim.; lateribus partis thoracicæ modice rotundatis, partis cephalicæ lateribus rotundatis quoque, hac parte tuberculis duobus nigris minoribus postice armata, a latere visa primum, pone tubercula, in arcum adscendente, tum leviter modo et secundum lineam parum arcuatam adscendente, denique, ad oculos, leviter arcuato-proclivi; niger, nitidus, pube argentea dense vestitus. Sternum nigrum, tuberculis ordinariis 7 humillimis, parum expressis, cum limbo antico rufescentibus, tuberculo pone labium vix ullo. Tuberculum oculorum mediorum humile, tuberculum oculorum lateralium costatum latam, obliquam, antice et postice præruptam, antice altiorem formans. Oculi medii æquales, in quadratum dispositi, spatio oculi diametro circiter triplo majore disjuncti; oculi laterales subæquales, (antici præsertim) mediis paullo minores, et spatio evidenter minore (oculi lateralis diametro circa triplo majore) disjuncti quam quo distant medii inter se; medii antici duplo longius a lateralibus anticis quam inter se remoti. Mandibulæ nigræ,  $3\frac{3}{4}$  millim. longæ (=tibiæ tertiæ paris), patellis et metatarsis omnibus longiores, latitudine basali fere duplo longiores, in dorso ad basin sat fortiter geniculato-convexæ, tum directæ, nitidæ, versus apicem transverse striatæ, intus nigricanti-pilosæ et -setosæ: sulcus mandibularis antice 3, postice 4 dentibus armatus; unguis niger, apice piceus. Maxillæ et labium nigra, apice pallida. Palpi nigri, nigro-pilosi, parte femorali subter argenteo-pilosa. Pedes graciles, femoribus et tibiis apice leviter modo incrassatis, rufescenti-vel testaceo-fusci, metatarsis, basi excepta, et tarsis nigris, coxis quoque obscurioribus, femoribus (apice præsertim subter nigro-piloso excepto) et tibiis basi late pube argentea tectis, hac pube subter crassiore; præterea nigro-pilosi, tibiis 4 anterioribus versus apicem subter et in lateribus, infra, tibiisque quarti paris totis pilis paullo longioribus et densioribus subvillosis. Primi paris pedes cephalothorace circa quintuplo longiores,  $49\frac{1}{2}$  millim. (patella  $3\frac{1}{4}$ , tibia  $9\frac{1}{2}$ , metatarsus  $14\frac{1}{4}$ , tarsus  $3\frac{1}{2}$ ), secundi paris  $39\frac{1}{2}$ , tertiæ  $21\frac{1}{2}$ , quarti 32 (patella  $2\frac{1}{4}$ , tibia 6) millim. longi. Aculei pedum graciles, sat rari; aculei pauci supra in pedibus anterioribus non ad apicem tantum, sed secundum totam internodii longitudinem dispositi. Abdomen subcylindricatum, fere duplo longius quam latius (13 millim. longum, 7 millim. latum), in fundo fuscum, fascia transversa pallida sat lata prope marginem anticum (!), pube sat densa argentea saltem antice tectum, in lateribus infra et postice striis 3-4 transversis subobliquis flavescentibus notatum; venter subfuliginæus, in medio flavescenti-maculatus; maculæ 4 parvæ flavescentes circa mamillas trapezium formant; scuta pulmonalia nigra, nitida, intus sulcis multis transversis profundis et subundulatis exarata. Vulva ex fovea magna nigra, transversa, plus duplo latiore quam longiore constare videtur, quæ fere lunata est, margine elevato antico recurvo, postico recto.

Mas ignotus.

Patria. Nova Caledonia. Exemplum unicum foemineum vidi, a

cel. Dr. Vinson amicissime communicatum. Priori speciei, *N. labillardierei*, simillima est hæc aranea, sed certe distincta: differt enim sterni tuberculis vix ullis, femoribus et tibiis anterioribus apice longius pilosis, mandibulis tarsis primi paris longioribus, abdomine duplo fere longiore quam latiore, cet.

In his description of the abdomen of *Aranea edulis*, Labillardière says (*loc. cit.* p. 241), "On voit sur les côtés cinq à six bandes obliques grisâtres et en dessous plusieurs tâches fauves." These words very well suit the specimen here described, but not those which I have above called *N. labillardierei*, and which I received from Dr. Vinson, together with the present specimen, under the name of *Epeira edulis* (Lab.). These two very closely allied species were no doubt united also by Labillardière under his *Aranea edulis*, which is used as food by the natives of New Caledonia (*conf.* Labillardière and Walckenaer *loc. cit.*).

#### NEPHILA MADAGASCARIENSIS, Vins.

*Cephalothorace brevior quam tibia cum patella quarti paris, nigro, bituberculato, pube densa argentea ad maximam partem tecto et setis aculeisque nigricantibus sparso, sterno nigro, tuberculo pone labium tuberculisque septem humilioribus ad insertionem cozarum instructo, quorum par tertium reliquis majus est; oculis lateralibus spatium duplam oculi diametrum æquante disjunctis; pedibus breviter et satis æqualiter nigro-pilosis, dense aculeatis, rufis, metatarsis basi excepta et tarsis nigris, patellis saltem anterioribus et apice femorum tibiisque nigricantibus; abdomine subcylindrico, plus duplo longiore quam latiore, nigro, dense argenteo-pubescente, fascia albicante transversa ad marginem anticum atrum, tum plaga antica inæquali flavescente et denique maculis multis secundum dorsum dispositis flaventibus vel argenteis variato; lateribus abdominis lineis obliquis maculisque ejusdem coloris pictis ventreeque fasciis duabus transversis angustis flavis, altera ad rimam genitalem, altera fere in medio ventris, notato.*

♀ ad. Long. 30-45 millim.

1863. *Epeira madagascariensis*, Vins. Aran. des îles de la Réunion, Maurice et Madag. p. 191, pl. vii.

*Fœmina.* *Cephalothorax* ad formam ut in *N. eduli* dixi omnino, sed præter pube densa argentea, qua ad maximam partem (plaga ordinaria postica nuda et parte cephalica in vicinitate oculorum exceptis) vestitus est, setis et spinulis sat longis sparsus, præsertim in parte cephalica. Tubercula postice in parte cephalica sat magna et acuta. Oculi laterales paullo minores quam medii, et spatium disjuncti, quod duplam eorum diametrum æquat: tuberculum, quo insistent, ad formam ut in *N. eduli*, postice declive, antice præruptum. Oculi medii in quadratum dispositi, æquales, spatium triplum oculi diametrum pene æquantibus inter se remoti. Sternum tuberculum sat magnum nigrum subacuminatum pone labium ostendit; tubercula lateralia humiliora sunt, obtusa, iis tamen, quæ ad coxas tertii paris locum tenent, majoribus et al-



tioribus, ovatis. Mandibulæ longiores quam tarsi primi paris, breviores quam tibiæ tertiæ paris; sulcus unguicularis antice 3, postice 4 dentibus armatus. Maxillæ et labium apice anguste testacea, præterea ut mandibulæ nigra. Palpi nigri, parte femorali rufescente. Femora et tibiæ versus apicem parum incrassata, quarti paris femora subter paullo densius nigro-pilosa quam reliqua internodia. Aculei pedum sat breves, in pedibus anterioribus densi, in femoribus horum pedum breves et etiam subter densi, ut in tibiis; subter in femoribus posterioribus aculei vix ultra ordinem singulam formant. Vulva ex fovea angusta transversa non magna constare videtur. Long. cephalothoracis in exemplo a me viso  $12\frac{1}{2}$ , lat. ejus  $9\frac{1}{4}$ , lat. frontis  $6\frac{3}{4}$ , long. mandibularum 5 millim. Pedes primi paris 65 (patella  $4\frac{1}{2}$ , tibia  $15\frac{1}{2}$ , metatarsus  $22\frac{3}{4}$ , tarsus  $4\frac{1}{4}$ ) millim., ideoque cephalothorace plus quintuplo longiores; secundi paris pedes  $55\frac{1}{2}$ , tertiæ paris 33, quarti  $52\frac{1}{2}$  (patella  $3\frac{1}{2}$ , tibia 11) millim. longi; abdomen 24 millim. longum, 11 millim. latum (long. totius corporis 31 millim.). (Vid. præterea descr. cel. Vinsonii loc. supra cit.).

*Patria.* Insula Madagascar. Fœminam unicam supra descriptam benigne ad me misit cel. Dr. Vinson.

The natives of Madagascar eat this Spider, "en l'accommodant avec de l'huile ou de la graisse" (vid. Vinson, 'Voyage à Madagascar,' p. 126).

EPEÏRA CUPIDINEA, n. sp. (Plate XXV. fig. 3.)

Cephalothorace brevior quam tibia cum patella quarti paris, humili, antice fortiter angustato, nigricante vel lurido, pube densa subargentea vestito, oculis mediis rectangulum dimidio longiorem quam latius formantibus, oculis lateralibus spatio oculi diametrum pæne æquante disjunctis, ab oculis mediis spatio duplo majore remotis quam quo distant medii antici vel postici inter se; pedibus nigricantibus, plus minus distincte subtestaceo-annulatis; abdomine ovato, longiore, antice bituberculato, dorso ante tubercula testaceo-albicante, argenteo-piloso, pone ea vero obscurius rufo- vel aureo-fusco, maculis argenteis ornato, quarum 4, antice, trapezium antice latius quam postice formant.

♀ ad. Long. circa 18 millim.

Fœmina. Cephalothorax inverse ovato-cordiformis fere, in lateribus ample et fortiter rotundatus, antice fortiter sinuato-angustatus, margine postico emarginato;  $7\frac{1}{2}$  millim. longus, 6 millim. latus, frontis latitudine modo  $2\frac{1}{2}$  millim.; brevior quam patella cum tibia quarti paris, tibiam primi paris longitudine æquans, tibiæ quarti paris longitudinem latitudine paullo superans; humilis, dorso fere plano et a latere viso recto, fovea centrali ordinaria paullo pone medium sita, sat magna et profunda, postice latior, subgeminata; in fundo nigricans vel saltem hic illic luridus vel subtestaceus, pube densa cinereo-albicante, subargentea tectus. Sternum breviter ovatum, tuberculis 7 ad insertionem coarum, nigrum, nigro-pilosum, vitta media longitudinali flava. Oculi subæquales; medii in tuberculo postice humili, antice prominenti

positi sunt, aream rectangulam, dimidio longiorem quam latiore occupantes; spatium inter oculos medios anticos, ut inter medios posticos, oculi diametro evidenter, pæne dimidio, majus est; medii antici a mediis posticis spatio oculi diametro pæne triplo majore distant, æque saltem longe atque a margine clypei. Oculi laterales bini tuberculo sat forti impositi, intervallo disjuncti sunt quod oculi diametrum vix æquat; spatium inter oculos posticos laterales et medios duplo majus quam spatium quo distant hi inter se. Series oculorum postica desuper visa recta vel parum procurva; oculi laterales antici paullo longius quam medii antici a margine clypei distant. Mandibulæ leviter reclinatae, femore antico angustiores, tibia antica vix crassiores, pæne duplo et dimidio longiores quam latiores, subcylindratae, in dorso versus basin arcuato-convexæ, tum vero rectæ, in medio immo subimpressæ, 3 millim. longæ (patellis primi paris paullo breviores); nitidæ, pilosæ, piecæ, macula media testacea notatæ; sulcus unguicularis dentibus fortibus antice 4 (quorum intimus reliquis minor), postice 3 armatus. Maxillæ nigrae, apice intus testaceæ; labium nigrum, apice testaceum. Palpi fuligineo-testacei, nigropilosi et -setosi. Pedes sat robusti, lurido-nigri, vix evidenter pallidius annulati, coxis macula obscure testacea notatis, præsertim subter pube lurida vel ferrugineo-testacea vestiti, nigropilosi, aculeis præsertim in tibiis subter longis et subappressis, sat debilibus, nigris et testaceo-fuscis; tibiæ quarti paris reliquis tibiis paullo robustiores sunt paulloque densius pilosæ videntur. Pedes primi paris  $31\frac{1}{2}$ , secundi 30, tertii 19, quarti 28 millim. longi; patella cum tibia primi paris  $10\frac{1}{2}$ , quarti paris  $8\frac{3}{4}$  millim. Abdomen sat regulariter ovatum, dimidio saltem longius quam latius (12 millim. longum,  $7\frac{1}{2}$  millim. latum), apice postico rotundato, antice tuberculis duobus subconicis, obtusis, haud ita magnis, circa in  $\frac{1}{5}$  longitudinis a margine antico distantibus, non ad ipsa latera, sed paullo magis intus locatis præditum; supra ante tubercula albicans, præterea vero obscure rufo-vel aureo-fuscum, argenteo, maculatum; tubercula postice maculis duabus argenteis occupantur; pone has maculas duæ aliæ magis versus medium sitæ adsunt, cum illis trapezium antice fere duplo latius quam postice, et brevius quam latius antice formantes; præterea multis aliis maculis minoribus argenteis notatum est dorsum, posterius duas series laterales formantibus; latera abdominis præsertim antice striis obliquis et maculis parvis argenteis notata; venter niger, serie utrinque pallida ex stria vel macula parva cum maculis binis ad latera mamillarum formata notatum. Vulva epigyni caret: constat ex area magna, transversa, nigra, plus duplo latiore quam longiore, marginæ fortiter elevato circumdata, quæ costa media humili in duas foveas subtransversas divisa est; margo anticus bis sinuatus est vel in medio in formam trianguli brevis retro productus; postice lamina elevata transversa limitantur hæ foveæ, quæ in medio incisa est itaque in duos lobos rotundatos divisa; margo lateralis foveæ latus exterius hujus laminae amplexitur. Mamillæ nigricantes.

*Mas ignotus.*

Fœmina jun., 10 millim. longa, differt cephalothorace et pedibus sordide testaceis, his nigro-punctatis et nigricanti-annulatis, tibiis quarti paris nigris, annulo basali testaceo; ventre fuligineo-testaceo, striis trinis brevibus flavescens in utroque latere, punctisque 4 vel 6 subargenteis in medio anterieus, in duo vel tria paria dispositis.

*Patria.* Nova Caledonia, ubi sat frequens inveniri videtur hæc aranea (Vinson in litt.); duas fœminas adultas ibi captas ad me misit cel. Vinson. Fœminam juniorem quoque possideo, a cel. Van Hasselt dono mihi datam, cujus patriam vero ignoro. *E. maritimæ*, Keyserl.\*, sine dubio valde propinqua est pulcherrima hæc species, sed verisimiliter diversa: abdomen *E. maritimæ* superne sordide album esse dicitur, area obscura nigricante vel rufescente, per totam longitudinem abdominis extensa, maculis paucis albis notata et vitta undulata alba utrinque limitata; quæ in nostram speciem non quadrant.


ARACHNURA SCORPIONOIDES, Vins.

1863. *Arachnoura scorpionides*, Vins. Aran. d'îles de la Réunion, cet. p. 291, pl. xiii. figs. 1, 1a.

1864. *Hapalochrota caudata*, Keys. Besch. neuer Orbitelæ, in Sitz.ber. d. Isis zu Dresden, 1863, p. 82 (20), tab. iii. figs. 6-11.

As this species has already been described and figured, both by Vinson and Keyserling, I shall here only give some few additional remarks, founded on the examination of a female specimen from Réunion which was kindly presented to me by Dr. Vinson. The length of the whole body is 12 millims., of cephalothorax nearly 4, of abdomen 10 (the "tail" about 4) millims. Breadth of cephalothorax  $3\frac{1}{4}$ , and = length of patella + tibia of the first or second pair of legs; breadth of abdomen about  $3\frac{3}{4}$  millims. When measured in the usual way, from the margin of cephalothorax, the proportion of the legs appears to be 2, 4, 1, 3, or 2, 1, 4, 3, the second pair being very slightly longer than the first and fourth pairs, which are of equal length (10 millims.); but when measured on the underside, from the base of the coxæ, the fourth pair are a little longer than the others. Length of third pair of legs nearly 7, of tibia + patella I. (or II.) nearly  $3\frac{1}{2}$  millims.; tibia I. is nearly 2, tibia + patella IV. nearly 4, tibia IV. 2 millims. The fore central eyes are larger than the other 6, which are almost equal; the area occupied by the four central eyes is double as long as broad in front, and about half as broad again before as behind. The lateral eyes are separated by an interval evidently larger than their diameter and rather larger than the interval between the fore centrals, this latter interval being somewhat smaller than an eye's diameter; the space between the posterior centrals is distinctly smaller than the diameter of these eyes. The femora of the first pair are slightly incrassated on the interior side towards the apex; they have 1, 1, 1 pale and slender

\* "Beiträge z. Kenntn. d. Orbitelæ," in Verhandl. d. zool.-bot. Gesellsch. in Wien, xv. p. 813 (15).

spines on the inner, and 1, 1, 1, 1 such spines on the outer side, all towards the apex; also the tibia has 1, 1 such spines on the inner side; with these exceptions the legs appear to be unarmed. The posterior part of the abdomen, from the anterior mamillæ, is encircled by closely set wrinkles; the skin of its sides, in front of the mamillæ, appears to be folded into closely set, elevated, longitudinal and somewhat undulated wrinkles. The vulva is a tolerably large, blackish, transverse area close by the rima genitalis: it is thrice as broad as long, and its lateral extremities are limited by a short inward curved costa: the anterior extremities of these two costæ are united by another costa curved forward and forming with them almost a , and limiting two shallow foveæ. The whole belly behind the rima genitalis is yellow.

According to Keyserling, the legs of the fourth pair are the longest, and the first pair slightly longer than the second; and the thighs, patellæ, and tibiæ of both first and second pair of legs are armed with spines. His two specimens were from Mauritius. Dr. Vinson tells me that he has found in the isle of Réunion a second species of *Arachnura*, "couleur jaune claire, jaune citron."

Is *Arachnura* really a good genus, different from *Epeïra*, for instance? I believe it is so, and consider, with Vinson, its chief characteristic to be the long, transversely wrinkled or annulated *flexible tail*, into which its abdomen is drawn out behind: this tail, says Dr. Vinson, is "susceptible d'abaissement et d'élévation, et se recourbe également vers le dos ou vers le ventre."

Whether the Australian Spiders described by L. Koch under the names *Epeïra higginsii*\* and *E. feredayi*† belong to *Arachnura*, is uncertain, as Dr. L. Koch does not state whether the tail in these Spiders is cross-ringed or -wrinkled, as in the typical species. To judge from his figures, the tail is destitute of such wrinkles; but if *E. higginsii* and *E. feredayi* should prove in this respect to resemble *A. scorpionoides*, I should not hesitate to refer them to *Arachnura*, even though their lateral eyes are separated by a smaller interval than in *A. scorpionoides*. The small difference in the relative lengths of the legs (1, 2, 4, 3, or 1, 4, 2, 3) does not appear to me to be a hindrance to our uniting them with *Arachnura* and removing them from *Epeïra*, from which genus they differ in the absence of spines on the legs, also in this respect showing some resemblance to *A. scorpionoides*, which has spines only on the first pair (or first two pairs) of legs.

LATHRODECTUS GEOMETRICUS, C. Koch. (Plate XXV. fig. 4.)

*Obscurius vel clarius nigro-vel rufescenti-fuscus, patellis et apice tibiæ late nigricantibus, cephalothorace fere dimidio brevior quam tibia primi paris, ordinibus oculorum extremitatibus non divaricantibus; abdomine secundum dorsum annulis angulatis tribus et vitta postica undulata geminata albicantibus notato, in lateribus fasciis 3-4 obliquis geminatis albicantibus ornato,*

\* Die Arachn. Australiens, p. 120, tab. xi. figs. 1-1b.

† Ibid. p. 122, tab. xi. figs. 2, 2a.

quarum apices superiores antice circa suam quisque maculam obscuriorem rotundatam plus minus distinctum curvati sunt; ventre ad maximam partem plaga flavescens, in medio constricta occupato; vulvæ margine antico tuberculum utrinque formante.

♀ ad. Long. 8-10½ millim.

Var. β. Pallide fuscus, abdomine cinereo-testaceo, maculis illis ab apicibus superioribus fasciarum lateralium limitatis obscure fuscis vel nigricantibus, series duas laterales in dorso formantibus; præterea formæ principali similis.

1841. *Latrodectus geometricus*, C. Koch, Die Arachn. viii. p. 117, tab. cclxxxiv. fig. 684.

Fœmina. Cephalothorax 3¾ millim. longus, brevior quam tibia quarti paris, fere dimidio brevior quam tibia primi paris, tibiam cum dimidia patella secundi paris longitudine æquans, 3 millim. latus, latitudine longitudinem tibie secundi paris parum superans; forma in hoc genere solita, fovea ordinaria media magna profunda transversa, sulcisque cephalicis bene expressis; ferrugineo-fuscus, tenuiter pallide pubescens, antice pilis nigris sparsus. Sternum subtriangulum, parum longius quam latius, fuscum, linea media pallidiore notatum. Oculi subæquales, laterales antici tamen reliquis, præsertim mediis anticis, evidenter minores; in series duas parallelas dispositi, series antica leviter procurva, postica et antica desuperne visæ recurvæ; spatium inter oculos laterales paullo minus, saltem non majus, quam spatium inter oculos medios anticos et posticos; oculi laterales, inter se spatio oculi antici diametro dimidio majore disjuncti, a mediis ejusdem seriei intervallo hunc spatium æquante remoti sunt spatioque paullo majore, quam quo distant medii ejusdem seriei inter se. Area oculorum mediorum paullo latior postice quam antice, parum vel vix longior quam latior postice; spatium inter oculos medios anticos oculi diametrum vix æquat, intervallum inter medios posticos oculi diametro evidenter majus est. Clypeus, cujus altitudo longitudine areæ oculorum plus dimidio major est, mox sub oculis profunde est impressus, a latere visus subdeclivis et convexus. Mandibulæ longæ et angustæ, in dorso basi ipsa paullo convexæ, præterea vero rectæ, longitudine patellarum secundi paris, tibiis anterioribus angustiores, triplo et dimidio saltem longiores quam latiores, nitidæ, leviter transverse striatæ et pubescentes, pallide ferrugineo-fuscæ; unguis tenuis, parum curvatus, latitudinem basalem mandibulæ vix longitudine superans. Maxillæ fuscæ, apice intus pallidæ, in labium fuscum transversum antice rotundatum inclinatæ. Palpi testaceo-fusci, nigro-pilosi. Pedes testaceo-fusci, tenuiter pallido-pubescentes, nigro-pilosi. Pedes primi paris cephalothorace plus sextuplo longiores sunt, in exemplo dimenso 23½ millim. longi (patella cum tibia 7½, tibia 5½ millim.); pedes secundi paris 16½, tertii paris 12, quarti paris 22 (patella eorum cum tibia paullo plus 6, tibia 4½) millim. longi. Abdomen globoso-ovatum, postice subacuminatum, tenuiter pubescens, obscurius vel pallidius rufescenti-fuscum; utrinque,

mox supra petiolum, adsunt lineæ duæ albicantes inæqualiter retro et extrorsum curvatæ, postice fortiter divaricantes, antice interdum in maculam vel anulum dilatatæ; secundum medium dorsum extenditur vitta ex annulis albicantibus tribus subæqualibus et vitta geminata ejusdem coloris formata: annulus primus angulato-rotundatus est, secundus et tertius, spatio minuto tantum disjuncti, rhomboides; tum, cum annulo tertio conjuncta, sequitur vitta sat brevis (secundum circiter quartam partem posteriorem dorsi extensa), posteriora versus angustata, utrinque linea albicante undulata limitata. In lateribus utrinque adsunt fasciæ trinæ vel quaternæ obliquæ longæ, albicantes, apice superiore subrecurvo suam quæque maculam obscuram rotundatam antice amplectentes, mox sub hac macula subito postice dilatatæ, versus apicem inferiorem (posteriorem) sensim angustato-acuminatæ et vitta obscura subcuneata geminatæ. Venter versus latera obscurius vel pallidius fuscus, plaga magna flavescente, in medio leviter constricta notatus, quæ a rima genitali pæne ad mamillas extenditur; ad latera mamillarum binæ maculæ parvæ flavæ adnænt et (plerumque) inter eas maculæ trinæ parvæ nigricantes, his maculis coronam circa anum et mamillas formantibus. Area vulvæ elevata, transversa, nigro-fusca a latere visa tuberculum subconicum format, cujus in apice adest vulva sub specie foveæ vel rimæ transversæ sat parvæ: margo ejus posticus elevatus æqualiter procurvus est, integer (non in medio incisus), margo vero anticus in medio rectus, ad utramque extremitatem in lobum brevem retro directum productus, his lobis tubercula duo assimulantibus.

Mas ignotus.

Variat ( $\beta$ ) pallidior, fusco-vel cinereo-testaceus, abdomine pallide cinereo-testaceo, pictura ut in forma principali quidem, sed magis diluta, parum distincta, maculis illis obscuris exceptis, a quibus initium capiunt fasciæ laterales: hæ maculæ utrinque 4 nigro-fuscae sunt et in series duas laterales valde manifestas ordinatæ (conf. figuram C. Kochii, loc. cit.). Vitta media postica in dorso abdominis interdum deest.

Patria. Africa, America meridionalis. Exempla pauca fœminea possideo, alia in insula Madagascar (ad sinum Bombétock) capta et a cel. Vinson communicata, alia ex Surinam, a cel. Van Hasselt missa. Var.  $\beta$  nostra eadem forma manifeste est atque *L. geometricus*, C. Koch; hoc nomen usurpavi, quum nullum aliud certum invenire potuerim; vix tamen est dubitandum quin sit hæc species etiam sub aliis nominibus descripta. Formam principalem secundum exempla Madagascariensis descripsi; var.  $\beta$  (cum forma principali) ex Surinam obtinui.

The females of *L. curacaviensis* (Müll.) may easily be distinguished from the above-described Spider by a darker, black or brownish black colour, by some small differences in the relative position of the eyes and in the form of the vulva, &c. (see Thor. Rem. on Syn. p. 511). The markings of the abdomen are also different, consisting in *L. curacaviensis* of a long, slightly sinuated, yellowish middle band, often geminated with reddish, and terminating at the anus in

a large yellowish or reddish spot; the sides have each four oblique, yellowish, sometimes geminated bands, of which one, commencing above the petiolum and curved forwards and downwards, is the longest and forms with the corresponding one of the other side, when seen from above, a very large  $\wedge$ , open at the apex; under this band is another smaller, almost longitudinal, and behind it two bands, tapering at the ends; but these markings are often more or less obliterated\*.

LATHRODECTUS CURACAVIENSIS, Müll.

♂ ad. *Cephalothorace fusco-testaceo, vitta media et marginibus infuscatis, pedibus fusco-testaceis, apice internodiorum plus minus late nigricantibus, cephalothorace quam tibia primi paris circiter dimidio brevior; abdomine fusco, pictura flava nigro-marginata: secundum dorsum vitta media longa, supra anum in maculam rufescenti-flavam dilatata, in lateribus fasciis trinis obliquis; prima earum longa est, foras et retro curvata, et sub ea vitta parva conspicitur; reliquæ duæ magis rectæ sunt; par primum harum fasciarum desuperne inspectum  $\wedge$  magnum format; venter plaga magna flavescente antice truncata in medio leviter constricta notatus est.*

*Long. circa  $3\frac{1}{4}$  millim.*

1776. *Aranea curacaviensis*, Müll. Linn. Vollständ. Natursyst. Suppl.- u. Reg.-Band, p. 342 (= ♀).

18—. *Theridion curassavicum*, Héring, conf. Ozanam, Étude s. le venin des Arachn. p. 29.

1860. *Latrodectus malmignattus*, var. *tropica*, Van Hass. Stud. over d. z. g. Curagao'sche Oranje-Spin, in Tijdschr. voor Entom. iii. p. 62, pl. 5. figs. 1-6 (= ♀).

1873. *Lathrodectus curacaviensis*, Thor. Rem. on Syn. p. 511 (= ♀).

Mas. *Cephalothorax*  $1\frac{1}{2}$  millim. longus, brevior quam tibia primi et quarti paris, tibiam cum dimidia patella secundi paris longitudine circiter æquans, paullo longior quam latior, forma in hoc genere solita, fovea ordinaria centrali pone medium locata, magna et profunda, impressionibus cephalicis tribusque sulcis radiantibus utrinque in parte thoracica profundis quoque; testaceo-fuscus, vitta media longitudinali fuliginea, marginibusque late subinfuscatis. Clypei altitudo evidenter, pæne dimidio, major quam longitudo areæ oculorum mediorum. Sternum ovato-triangulum, antice late truncatum, obscurius fuscum, vitta media longitudinali subtestacea. Oculorum series antica procurva, ambæ series desuperne visæ recurvæ, extremitatibus non divaricantibus, sed paullo appropinquantibus: spatium inter oculos laterales paullo minus est quam spatium inter oculos medios anticos et posticos, et oculi lateralis diametrum æquat.

\* The female of *L. curacaviensis* has been carefully described and figured by Van Hasselt (*loc. infra cit.*); the male, on the contrary, is still unknown, and a short description of a male example which Dr. Van Hasselt has kindly sent me will therefore probably not be considered out of place here.

*Spatium inter oculos medios posticos diametro oculi non majus est, inter eos et laterales paullo majus. Area oculorum mediorum pæne quadrata, modo paullo latior antice quam postice; oculi medii antiqui reliquis paullo majores, inter se paullo longius, spatio oculi diametrum fere æquante, quam a lateralibus anticis sejuncti. Mandibulæ testaceo-fusca, subreclinata, in dorso rectæ, versus apicem sensim subangustata, plus duplo longiores quam latiores basi. Maxillæ apice extus rotundata, testaceo-fusca, apice intus pallidiores, in labium transversum fuscum apice late rotundatum paullo inclinata. Palpi testaceo-fusci, breves; pars patellaris latitudine apicali vix vel parum longior, versus apicem sensim paullo incrassata, apice oblique rotundata, ut pars femoralis basi metatarsorum anteriorum non crassior; pars tibialis parte patellari etiam brevior, supra, exterius, in lobum oblongum foras et sursum directum, interius vero in lobum brevem intus directum producta, his lobis parti tarsali arcte adjacentibus et cum ea in clavam maximam, femore antico plus duplo latiore, antice latissime truncatam, semiorbiculatam vel campanulatam fere, extus et infra profunde et late excisam concretis; apex clavæ helice magna, plana, gyris saltem 3, e seta crassa longissima complanata nigra formata occupatur; ipsa pars patellaris dimidiam partem clavæ anteriorem et superiorem tantum formare videtur et sulco longitudinali quasi in duas partes dividitur, anteriorem majorem testaceo-fuscam, posteriorem angustiore, obscuriorem, ferrugineo-fuscam (hæc pars interior forsitan non ad partem tarsalem, sed ad bulbum pertinet?); angulus apicis partis tarsalis interior et inferior in procursum longum deorsum et paullo foras directum productus est, cujus apex ut lobus rotundatus et pilosus sub apice clavæ prominat; sub hoc lobo procursum tenuis pallidus deorsum curvatus adest. Pedes graciles, testaceo-fusci, patellis apice, tibiis annulo versus apicem et præterea summo apice nigricantibus, reliquis internodiis quoque apice anguste et plus minus distincte infuscat. Tibiæ supra setas binas erectas ostendunt; præterea pedes pube et pilis nigris appressis minus dense vestiti sunt. Pedes primi paris cephalothorace circa  $6\frac{1}{2}$  longiores,  $9\frac{3}{4}$  millim. (tibia cum patella  $2\frac{2}{3}$ , tibia paullo plus 2), secundi paris 6, tertii  $4\frac{1}{2}$ , quarti  $8\frac{1}{2}$  (tibia cum patella  $2\frac{1}{2}$ , tibia  $1\frac{5}{8}$ ) millim. longi. Abdomen subovatum, pilis pallidis longioribus sparsum, cinerascens-fuscum, vitta media longa flavescens per dorsum extensa et supra anum in maculam rufescenti-flavam leviter dilatata ornatum, in lateribus vero fasciis duabus longis flavis deorsum et retro curvatis, supra petiolum initium capientibus, posteriora versus valde divaricantibus,  $\wedge$  magnum, quum desuperne inspicitur cephalothorax, formantibus, et sub utraque earum, antice, vitta parva fere longitudinali notata, magis vero postice fasciis binis transversis obliquis flavis, omnibus his vittis et fasciis anguste nigro marginatis. Venter nigricans, plaga magna media flavescens antice truncata, in medio leviter angustata.*

*Fœminæ diagn. et descr. vid. in Van Hasselt, loc. cit.*



*Patria hujus speciei America meridionalis (Curaçao, Aruba, Bonaire, et cet.). Locum, ubi inventus fuerit mas supra descriptus, ignoro.*

Respecting the habits and supposed venomousness of this Spider, conf. Ozanam, and especially Van Hasselt, *locis cit.*

HETEROPODA? VIRIDIS (Vins.).

1863. *Olios viridis*, Vins. Aran. de la Réunion. *cet.* p. 103, pl. xi. fig. 2.

Of this species only one female example (from Madagascar) was received; it appears to be not fully adult, which may account for a few differences between Vinson's description and what I have observed. The beautiful pale-green colour of living specimens is, as has been remarked by Dr. Vinson, totally lost when the animal is placed in spirit of wine; it then becomes of a dull brownish yellow, with the slightly incrassated tarsal joint of the palpi brownish black, only a little paler at the base and apex. The cephalothorax is 4 millims. long and 4 millims. broad; it is tolerably high and rather convex above, being highest just behind the base of the second pair of legs, sloping gradually and slightly towards the eyes; the hind slope is shorter and more abrupt. The cephalic grooves are faint; the hind slope has a longitudinal, rather strong, central groove, about as long as the mandibles. The height of the clypeus nearly equals the diameter of the fore central eyes. The eye-series are almost perfectly parallel, the anterior nearly straight, very little curved forwards; the posterior series, seen from above, is straight and longer than the anterior; the fore lateral eyes are evidently larger, the hind centrals smaller than the other eyes. The area occupied by the central eyes is somewhat larger behind than in front, scarcely shorter than broad behind. The anterior central eyes are separated by an interval about as great as the diameter of an eye, and a little greater than the interval which separates them from the anterior laterals. The eyes of the posterior row are equally distant from each other, their interval being about twice as great as the diameter of the posterior lateral eyes. The lateral eyes are nearly equal; their interval is about once and a half the diameter of an eye, and little or nothing smaller than the interval between the fore and hind centrals. The mandibles are  $1\frac{1}{2}$  millim. long (= patella of the fourth pair), double as long as broad, nearly as thick as the fore thighs, rather equally convex longitudinally, shining, reddish yellow, with long, rather scarce, pale hairs; the anterior margin of the claw-furrow is thickly ciliated, the posterior armed with about five small teeth, of which the two inner are the longest. The maxillæ are convex, scarcely half as long again as broad, somewhat narrowed towards the base, with both the exterior and interior side of the apex truncatedly rounded; they are very slightly inclined towards the labium, which is not half as long as the maxillæ, at least double as broad as long, with the apex broadly rounded. The first pair of legs are 19 millims. long (patella + tibia  $6\frac{3}{4}$ , tibia 5), second pair  $19\frac{1}{2}$ , third pair 13, fourth pair 16 millims. (their patella + tibia  $5\frac{1}{2}$ , tibia nearly 4 millims.). The legs

are armed with tolerably numerous spines, which are very long and appressed on the underside of the tibiae and metatarsi: the thighs of the first pair of legs, for instance, have above 1, 1, before and behind 1, 1, 1, beneath 2, 2 spines; their patella has one spine behind, the tibia and metatarsus before and behind 1, 1, beneath 2, 2 spines, the tibia, moreover, one spine above. The tarsi are fusiform, convex longitudinally above; their underside, like that of the anterior metatarsi, is provided with a scapula.

This species must probably be removed from *Heteropoda* (Latr.), Thor.\* (of which genus *Aranea venatoria*, Linn., *Olios leucosios*, Walck., is typical), and should perhaps be made the type of a separate genus.

*PHRYNARACHNE* † *FOKA* (Vins.).

1863. *Thomisus foka*, Vins. Aran. de la Réunion, *cet.* p. 69, pl. xiv. fig. 4.

1865. *Thomisus foka*, Vins. Voyage à Madagascar, p. 186, pl. iv. fig. 3.

It is very uncertain whether this species be the true "foka" or "fook" of the natives of Madagascar; as to their opinions regarding the venomousness of that redoubted Spider *vide* Vinson, Aran. de la Réunion, &c. p. 71. But in his letter to me Dr. Vinson says:—"Depuis mon voyage à Madagascar, j'ai des doutes sur les qualités vénéneuses qu'on prête à cette araignée. Je l'ai trouvée à la Réunion (la même) fort inoffensive. La fameuse Foka ou Fouque, comme disent les Malgaches, serait le fameux *Eresus guérinii* qui habite aussi l'Algérie. C'était ma première opinion par analogie de contrée et de voisinage géographique, et j'y reviens. Je n'ai pu jusqu'à présent toutefois approfondir cette question."

The specimen sent me by Dr. Vinson, an adult female, is from Madagascar. Its colour is dark reddish brown, with exception of the tibiae, metatarsi, and tarsi, and the tibial and tarsal joints of the palpi, which parts are of a bluish black colour. The structural details contained in the following description may in some degree serve as a complement to that given by Dr. Vinson.

*Fœmina. Cephalothorax* pæne 6 millim. longus,  $5\frac{1}{2}$  millim. latus, tibia cum patella primi paris longitudine saltem aequans, lat. frontis leviter rotundata  $2\frac{3}{4}$  millim., lateribus partis thoracicae fortiter et ample rotundatis; margine postico emarginato; altissimus, a medio anteriora et posteriora versus satis aequaliter declivis, declivitate postica nitida, fere lævi, fovea media rotundata mediocri, parum profunda; præterea tuberculis magnis et parvis undique valde inæqualis et scaber, tuberculis majoribus plerisque partis cephalicae in ordines longitudinales tres minus æquales ordinatis, impressionibus cephalicis parum expressis; clypeus scaber et tuberculatus, non directus, sed cum mandibulis

\* On Eur. Spid. pp. 174, 177.

† *Phrynarachne*, Thor. 1869, = *Phrynoides*, Sim., 1864 (*vide* Thor., On Eur. Spid. pp. 37, 182). [*Phrynoidis*, Fitz. (Reptil.), 1843.]

proclivis, longitudinem areæ oculorum mediorum altitudine non æquans. Sternum ovatum, pæne dimidio longius quam latius, antice leviter emarginatum, tuberculis minutis suum quoque pilum gerentibus obsitum. Oculorum series antica fortius, postica levius recurva; oculi laterales antichi reliquis fere duplo majores, oculi medii postici evidenter sed non multo minores quam laterales postici et medii antichi, qui fere æquales sunt. Area oculorum mediorum pæne quadrata, paululo modo latior postice quam antice et æque longa atque lata antice. Oculi antichi medii spatiis fere æqualibus inter se, a mediis posticis et a margine clypei disjuncti, his spatiis oculi medii antichi diametro circiter quadruplo majoribus, et evidenter sed non dimidio majoribus quam spatium quo a lateralibus anticis remoti sunt medii antichi. Oculi medii postici paululo longius inter se quam a lateralibus posticis distant; intervallum inter oculos laterales circiter dimidio minus est quam spatium inter medios anticos et posticos, vel inter posticos medios et laterales, sed paulo majus quam spatium inter anticos medios et laterales. Quum oblique a latere et ab antice inspicitur cephalothorax, oculi laterales cum oculo medio antico ejusdem lateris lineam rectam designant. Mandibulæ versus apicem sensim angustatæ, subconicæ,  $2\frac{1}{4}$  millim. longæ, fere duplo longiores quam latiores basi, a latere visæ angulato-convexæ, latere exteriori ad basin in costam elevato, dorso ad basin exterius in formam fere trianguli subplano et tuberculis minutis tantum scabro; præterea vero in dorso tuberculis majoribus et minoribus inæquales et scabræ sunt mandibulæ pilisque brevioribus sparsæ; sulcus unguicularis antice dentibus paucis parvis armatus et dense ciliatus; unguis parvus, longitudine latitudinem apicis mandibulæ vix superans. Maxillæ parallelæ, vix in labium inclinatæ, longæ et angustæ, saltem duplo longiores quam latiores, in latere exteriori leviter sinuatæ, apice extus rotundatæ, apice intus late et oblique truncatæ. Labium maxillis duplo brevius, paulo longius quam latius basi, ovato-triangulum, apice obtuso. Palpi metatarsis anticis paulo angustiores, superficie inæquali et scabra, aculeati et pilosi, parte tibiali vix longiore quam patellari, dimidio longiore quam latiore; pars tarsalis versus apicem sat fortiter angustata, subacuminata, parte priore plus dimidio longior. Pedes valde robusti, præsertim anteriores, inæquales valde et scabri, coxis subter fere levibus, nitidis, aculeis brevibus armati, aculeis subter in tibiis et metatarsis paulo longioribus et fortioribus. In tibiis anterioribus aculei inferius utrinque binas series formant. Unguiculi tarsorum versus basin dense pectinati. Pedes primi paris 16 millim. longi (patella cum tibia  $5\frac{1}{2}$ , tibia 3 millim.); secundi paris iis parum breviores; quarti paris, qui tertii paris pedibus paulo longiores sunt,  $10\frac{1}{2}$  millim. longi (patella cum tibia  $3\frac{3}{4}$ , tibia 2 millim.). Abdomen subpentagonum, antice subtruncatam, posteriora versus sensim paulo dilatatum, versus anum rursus subito et fortiter angustatum, subacuminatum, cute dura valde inæquali et rugosa tectum: latera ejus in tubercula magna vel quasi mammulas

*elevata sunt, quæ inferius minora sunt quam supra: præterea supra et in lateribus tuberculis humilibus sparsum est, quæ vel rotunda vel oblonga sunt, sulco suo quodque circumdata, in dorso, ubi pleraque in series duas longitudinales undulatas ordinata sunt, nitida, læviora, in mammulis magnis lateralibus magis scabra et inæqualia. Supra anum rugas aliquot transversas ostendit abdomen. Vulva valde simplex: ex fovea parva constare videtur, quæ antice callo nitido subprocurvo limitatur. Mamillæ posticæ anticis longiores, articulo primo cylindrato, paullo longiore quam latiore, secundo parvo; mamillæ anticæ crassiores sunt quam posticæ, subconicæ, articulo primo multo breviora quam latiore basi; mediæ reliquis multo angustiores, anticæ longitudine pæne æquantes.*

*Patria. Inss. Madagascar et Réunion.*

*MISUMENA VINSONII, n. sp.*

*Cephalothorace rufescenti-fusco, granulato, posterius fortiter elevato, longitudine patellam, tibiam et metatarsum quarti paris conjunctim æquante; oculis lateralibus tuberculo obtuso impositis; pedibus cum palpis testaceis, metatarsis apice cum tarsis infuscatis, tantum subter in tibiis et metatarsis aculeis brevissimis armatis; abdomine subpentagono, flavescente, in lateribus ad longitudinem, postice vero transverse rugoso, his rugis nigro-punctatis, supra punctis 5 majoribus nigris notato.*

♀ adult. (?) Long. circa 10 millim.

*Fœmina. Cephalothorax æque latus atque longus, 4½ millim., patellam + tibiam + metatarsum quarti paris longitudine æquans, lateribus partis thoracicæ fortiter et amplissime rotundatis, antice sensim (et sinu levi mox pone oculos) angustatus, fronte leviter rotundata, 2½ millim. lata, margine postico leviter rotundato et in medio paullo emarginato; pone medium altus valde, pæne gibbosus, a latere visus dorso anteriora versus ad oculos secundum lineam leviter concavo-curvedam sensim proclivi, postice secundum lineam pæne rectam, modo levissime arcuato- (convexo-) curvatam declivi, hac declivitate postica sat longa et prærupta, fere plana, lævi et nitida, fovea media ovata sat magna; præterea granulis parvis nitidioribus sat densis scaber est cephalothorax, impressionibus cephalicis parum expressis, rufescenti- vel testaceo-fuscus, fascia transversa clariore subtestacea inter oculos; oculi laterales bini tuberculo obliquo obtuso impositi (hoc tuberculo non acuminato neque in spinam producto); clypeus fere directus, altitudine dimidiam areæ oculorum mediorum longitudinem non multo superans. Sternum subovatum, antice leviter truncato-emarginatum, subtestaceum. Area oculorum triangulum antice truncatum format fere; series antica fortiter recurva est, postica, desuper visa, leviter modo recurva; oculi laterales anticæ reliquis oculis non parum majores sunt, medii postici paullo minores quam laterales postici, qui pæne æque magni sunt atque medii anticæ. Area oculorum mediorum rectangula,*

circa  $\frac{1}{2}$  longior quam latior; oculi medii antici vix vel parum longius inter se quam a lateribus anticis remoti, hoc intervallo oculi medii diametro circiter quadruplo majore; medii antici longius a mediis posticis quam a margine clypei remoti; oculi laterales intervallo disjuncti, quod paullo minus est quam spatium inter oculos anticos laterales et medios, et pæne duplo minus quam spatium inter medios anticos et posticos; oculi medii postici paullo longius a lateribus posticis quam inter se distantes. Mandibulæ longitudine tibiae quarti paris (patellis anterioribus breviores) basi tibiam primi paris crassitie saltem æquant, versus apicem sensim angustatæ, tamen apice sat late truncatæ, non in margine exteriori sinuatæ, in dorso sat fortiter convexæ, ipsa basi fere planæ, ibique in latere exteriori subelevato-marginatæ; tenuiter rugulosæ et transverse substriatæ, pilis brevibus sparsæ, rufescenti-fuscæ, apice intus longius pilosæ, marginibus sulci unguicularis dense ciliatis; unguis brevis, fortiter curvatus. Maxillæ longæ et angustæ, plus duplo longiores quam latiores, in latere exteriori leviter sinuatæ, apice rotundatæ, testaceæ, in labium iis pæne duplo brevius, oblongum, in lateribus leviter rotundatum, versus apicem rotundato-acuminatum sensim angustatum leviter inclinatæ. Palpi breves, crassitie metatarsorum, aculeis brevibus sparsi, pilosi, testacei; pars tarsalis versus apicem obtusum sensim angustata, parte tibiali vix dimidio longior. Pedes testacei, metatarsis apice late cum tarsis infuscatis; anteriores longi et fortes; omnes granulis parvis, suum quoque pilum brevem appressum gerentibus dense scabris, remanentibus tamen supra in femoribus, patellis, tibiis et metatarsis (saltem ad partem) vittis binis sat latis lævibus. Femora et patellæ omnes, ut tibiæ et metatarsi posteriores, aculeis carere videntur; tibiæ anteriores subter versus apicem aculeos paucos, omnium brevissimos, in series binas ordinatos habent, metatarsi anteriores subter series duas in medio abruptas aculeorum brevium nigrorum ostendunt, circiter 6 in utraque serie. Tarsi anteriores versus apicem late truncatum sensim paullo incrassatæ. Pedes primi paris 16 millim. longi (patella cum tibia  $5\frac{1}{2}$ , tibia  $3\frac{1}{5}$  millim.); secundi paris fere  $15\frac{1}{2}$ , tertii 8, quarti paullo plus 9 millim.; patella cum tibia quarti paris 3, tibia pene  $1\frac{2}{3}$  millim. Abdomen subpentagonum, postice utrinque subangulatum; antice truncatum est, tum lateribus subrectis ad circa  $\frac{2}{3}$  longitudinis gradatim paullo dilatatum, deinde lateribus leviter rotundatis angustato-acuminatum, hac parte postica rotundato-declivi; circa  $5\frac{1}{2}$  millim. longum et latum, in lateribus ad longitudinem, in declivitate postica transverse sat dense sulcatum, his sulcis punctis nigris impressis sat densis, hic illic in lineis confluentibus, notatis; dorsum punctis ejusmodi minutis sparsum est, anterieus vero et in medio puncta 5 majora nigra ostendit, quarum 4 posteriores in rectangulum subtransversum ordinatæ sunt; ad ipsum marginem anticum series transversa punctorum ejusmodi parvorum adest. Venter

*subtestaceus, basi nigricans; loco vulvæ callus transversus ferrugineo-fuscus adest. Mamillæ posticæ cylindratae, multo angustiores et paullo longiores quam anticae, quæ crassæ et conicæ sunt; mamilla mediæ fere duplo angustiores et breviores quam posticæ.*

*Mas ignotus.*

*Patria.* Madagascar, ubi hanc speciem detexit cel. Alf. Grandidier.

This species is no doubt closely allied to *Thomisus tripunctatus*, Lucas\*; but I do not think that it is identical with that West-African species. In *Th. tripunctatus*, according to Lucas, the cephalothorax is prolonged on either side anteriorly (between the lateral eyes) into "a very sharp spine," the mandibles are constricted or sinuated on the outer side towards the apex, and the third pair of legs are longer than the fourth pair &c., which is not the case in the above-described Spider from Madagascar, kindly sent me by Dr. Vinson.

In naming this Spider after Dr. Vinson I only utter a feeble expression of my respect for his scientific merits and my thankfulness for the kindness he has shown me.

#### PEUCETIA LUCASII (Vins.).

1863. *Sphasus lucasii*, Vins. Aran. d. îles de la Réunion. p. 35, pl. xiii. fig. 3.

The colour of this beautiful Spider is much changed in examples preserved in spirit of wine; the cephalothorax is of a dull and pale olive-green colour, the *pars cephalica* being limited posteriorly by a large  $\vee$  of a paler yellowish tint. The legs are yellowish brown, somewhat paler towards their base, brownish black at the extremity; the trochanters are blackish; the thighs and patellæ have a narrow blackish ring or spot at the apex. The abdomen is greenish, with a brownish band along the middle of the back; this band is limited on either side by a whitish band or line, which anteriorly, towards the base of the abdomen, is continued by a series of about four unequal, somewhat oblique, whitish spots. The olive-greenish belly shows two longitudinal yellow bands or lines, the space between these bands being of a darker brownish tint. The two small fore eyes are separated from each other (and from the large middle eyes) by an interval equalling their diameter; the interval between the large (fore) middle eyes is evidently greater than their diameter, but scarcely greater than the interval between them and the hind lateral eyes. The area of the four centrale eyes is about one fourth larger in front than behind, as long as broad in front; the fore central eyes are separated from the hind centrals by an interval about double as great as the diameter of the largest eyes. The hind series of eyes is slightly curved forward; these eyes are nearly of the same size (the centrals, however, slightly larger than the laterals), and are separated by nearly equal intervals, at least as great as the diameter of the hind centrals. The height of the clypeus is somewhat greater than

\* Descr. d. Arachn. qui habitent le Gabon (Voyage au Gabon), in Thomson, Archives Entomol. ii. p. 24, pl. xii. figs. 3, 3a.

the length of the whole eye-area. The form of the vulva is very complicated; this organ consists chiefly of a large, broad, almost triangular or heart-shaped, corneous, slightly elevated, uneven blackish area, the base of which is directed forwards; this area shows a longitudinal furrow in the middle, and two other shorter and oblique ones on each side: in front the vulva is limited by a raised margin curved backwards; and in the almost half-moon-shaped space between this margin and the base of the triangular area are two corneous obtuse teeth proceeding from the angles, and directed inwards and forwards. The two examples seen by me are females. In the larger of them the length of the cephalothorax is  $6\frac{1}{2}$  millims., its breadth  $5\frac{3}{4}$  millims., breadth of forehead (clypeus) 3 millims., height of clypeus  $1\frac{2}{3}$  millim.; length of mandibles 3 millims.; first pair of legs 32 millims. (patella + tibia  $10\frac{1}{2}$ , tibia  $8\frac{1}{4}$ ), second pair 29, third pair 22, fourth pair 24 (patella + tibia  $7\frac{3}{4}$ , tibia 6) millims.; length of abdomen  $11\frac{1}{2}$ , breadth  $5\frac{1}{4}$  millims.

From Madagascar.

#### EXPLANATION OF PLATE XXV.

Fig. 1. *Nephila labillardieri* ♀, p. 130. Cephalothorax and abdomen, seen from above.

2. *Nephila labillardieri* ♀, var. β.

3. *Epeira cupidinea* ♀, p. 135.

4. *Lathrodectus geometricus* ♀, p. 138. Abdomen, seen in profile.

6. Descriptions of some supposed new Species of Birds from the Fiji Islands. By E. L. LAYARD, F.Z.S., H.B.M.C. administering the Government.

[Received February 24, 1875.]

#### 1. LALAGE NIGROGULARIS, sp. nov.

General colour above brown, below cinereous; top of head cinereous; each feather having a pale edge, presents a slightly scaled appearance; wing-feathers brown, inner webs darkest, outer webs slightly tinged with greenish yellow on the outer edge; tail-feathers in strong light closely barred; covering the nostrils is a patch of black extending into a broadish eyebrow: this coalesces with the black of the throat behind the ear, which is covered by a large white patch; above the black eyebrow a faint whitish streak; chin and upper portion of throat black, this separated from the cinereous of the underparts by a broken, irregular, white band; vent and under tail-coverts whitish, tinged with isabella colour; underside of wing- and tail-feathers paler than the upper, the latter much paler at the tips; upper edge of the wing inside deep black; axillaries whitish; bill and legs blue, changing into black after death; iris brown. Length 8", wing 4" 1"', tail 3" 9"', tarsi 1" 1"', bill 1" 2'''.

This description is taken from a male in full breeding-plumage, testes well developed, shot on the 16th of November, on the hills at the back of Levuka. The natives to whom it was shown did not know

it, and had no name for it. Another, probably the female, was in company with it; but before the gun could be recharged it made off. Its stomach contained insects, which its strong hooked bill eminently fits it to capture and tear in pieces. Its resemblance in this respect is so Shrike-like that Mr. Kleinsmidt, a gentleman whose name is well known in connexion with Fijian zoology, exclaimed, at the first glance, "It is a Shrike."

I have no description of the genus *Lalage*, and therefore place it therein with some hesitation; but I know not where else it can be located, and its general appearance seems to tally with the form of *L. banksiana*, figured in Brenchley's 'Cruise of the Curagoa.'

## 2. TATARE? VIRIDIS, sp. nov.

*Male.* General colour throughout uniform olive-green, tinged with yellow; inner webs of primaries very dark green, outer webs golden green; shafts of wing- and tail-feathers black above, pale yellow below; underside of wing pale buff; plumage somewhat lax; tail-feathers pointed; first quill of wing half the length of third, second quill much shorter than the third, which is shorter than the fourth; fourth, fifth, and sixth equal; seventh and others succeeding graduated. Bill and legs light orange, the former much curved, the latter strong, broadly scutellated in front, none behind. Length 10"; wing 5" 2"; bill 1" 10"; tarsi 1" 6". Claws dark horn-colour, much curved.

This singular bird, of which the native name is *Toti*, was procured in the mountain-regions of Taviuni, one of the Fiji Islands, by Lieut. Liardet, late of H.M. Navy. He describes it as "*creeping*" about the trunks of trees. Another was in company, but escaped. Iris deep red; tongue long, brushed at the tip.

## 3. PACHYCEPHALA TORQUATA, sp. nov.

*Male.* Back, wings, and tail very dark, almost black, shaded with green on the outer edges of all the wing-feathers and back; tip of tail pale; head above black; all the underparts of body and flexure of wing bright orange; the gorget crossed by a broadish crescent-shaped black collar; at the back of the neck or nape an indistinct (specimen badly preserved) orange collar; underside of wings and tail lighter than above, the inner edges of the secondaries buff; tip of tail pale; bill black; legs horn-brown. Length (circa) 7"; wing 3" 10"; tail 3"; tarsi 1"; bill 1 1/2".

*Female.* Red-brown above, much paler beneath; chin rufous; edges of wing-feathers and vent rufous.

Shot in the mountains of Taviuni by Lieut. Liardet. Described as very quick in its motions and restless, always on the move. Its native name is *Kula-oso*. *P. vitiensis* is similar in its habits.

## 4. PACHYCEPHALA MACRORHYNCHA, sp. nov.

General colour throughout reddish brown, paler on the underside, palest on the chin, reddest about the rump; tip of tail pale; bill very large, black; legs bluish. Length (circa) 7"; wing 3" 6"; tail 3"; bill 1" 2"; tarsi 10". Iris dark brown. Sex unknown.



This species was also procured by Lieut. Liardet in the mountains of Taviuni. Native name *Ai-sou*.

5. *CHRYSÆNA VIRIDIS*, sp. nov.

*Male*. General colour darkish green; head soiled golden yellow without gloss; under tail-coverts bright chrome-yellow; thighs, lower part of belly, and vent French grey; the green of the back and sides of the chest glossed with gold; these feathers have the V-shaped termination as in *Ptilinopus*; and the first primary shows a tendency to narrowing as in that genus. Primaries edged with yellow, secondaries brilliant green; the inner webs of both golden yellow, as is the underside of the flexure and the inside of the wing; underparts less brilliant than the upper, except on the chest, where there is a beautiful green sheen in certain lights; bill blue-black, tip pale livid; legs very dark crimson; iris yellowish. Length 7"; wing 4" 6"; tail 2" 3"; tarsi 10"; bill 10".

*Female*. Less brilliantly coloured, especially about the head.

I obtained this lovely species at Kandavu on the 8th of August, evidently breeding, the *testes* of the males being enormously developed. It fed on the berries of a species of banian, and appeared to be not very uncommon. One of the naturalists of the 'Challenger,' Dr. von Suhm, obtained several specimens, but wrongly identified it as *C. luteovirens*, which he did not procure. I agreed with him at the time, till I obtained specimens for myself, and, finding it in the full breeding-stage, came to the conclusion that my first impression of it being *C. luteovirens* not in breeding dress must be erroneous. The acquisition of *C. luteovirens* in all stages showed me, beyond a doubt, that it is distinct; I therefore describe it as an addition to the genus *Chrysæna*.

I have been puzzled by the natives identifying the female of this and of *C. luteovirens* with *C. victor* of Gould; but I think I may now affirm, from both native and European testimony, that the female and young male of that species are green, as are those of *C. luteovirens*. *C. victor* is more widely distributed than I at first thought; it has been obtained at Lanthala, Bua, Ngamēa, and Taviuni. The natives call it "*Bulindamu*;" at Kandavu they called *C. viridis* "*Sokulu*;" on Ovalau they designate *C. luteovirens* by the name of "*Buniaco*." The *Carpophagus* and *Columba vitiensis* they call "*Rūbē*" (Rubey), and *Phlegænas stairi* "*Ngilu*"\*.

7. On the Form of the Lower Larynx in certain Species of Ducks. By A. H. GARROD, F.Z.S.

[Received March 2, 1875.]

The present communication contains descriptions of the condition of the lower larynx in some rare members of the *Anatidæ*, which are not referred to in the works of either Mr. Eyton or Mr. Yarrell.

\* Italian vowels.

1. *SARCIDIORNIS MELANOTA* (Gm.): Sclater, Rev. Cat. Vert. p. 241.

To Mr. Eyton, who established the genus to which this peculiar bird belongs, the visceral anatomy was unknown; and I am not aware of any subsequent description of it having been published. A pair were purchased by the Society on the 18th of September, 1867, the female of which died on the 10th of March, and the male on the 18th of October last year; these are the specimens which I have examined. In both sexes the diameter of the trachea diminishes slightly at its lower extremity before it again expands a little to end in the syrinx. As in birds generally, the tracheal rings are complete and notched in the middle line before and behind, in such a way that where they meet the two halves overlap and are overlapped respectively by the rings above and below them. The lower tracheal rings, however, in both sexes are much thinned in front, as is the case in the male of *Harelda glacialis*\*; they are not ossified together.

In the male *Sarcidiornis melanota* (fig. 1) there are 20 anterior,

Fig. 1.

Fig. 2.

Fig. 3.

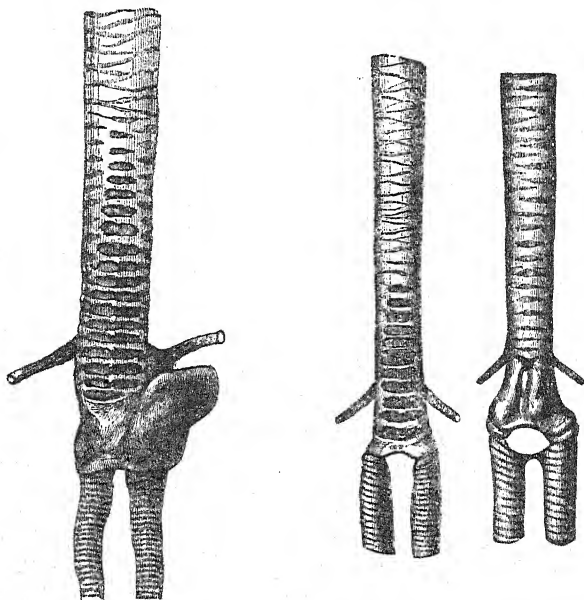


Fig. 1. Lower part of trachea of *Sarcidiornis melanota* ♂.

Fig. 2. Ditto of *Sarcidiornis melanota* ♀.

Fig. 3. Ditto of *Rhodonessa caryophyllacea* ♀.

membrane-covered fenestræ, formed in the intervals between these

\* *Vide* figs. Eyton's 'Anatidæ,' plate opposite p. 65; Yarrell's Brit. Birds, vol. iii. p. 261.

thinned rings; in the female (fig. 2) there are only 12 of the same. In the latter there is no lateral diverticulum from the syrinx; but in the former, from the left side, as usual, one is developed, entirely osseous, irregularly compressed, and very small, not having a diameter in any part greater than that of the trachea itself (*vide* figs. 1 & 2).

In the male specimen the cæca are 3 and  $2\frac{1}{2}$  inches long; in the female not quite 2 inches. Their diameter is inconsiderable, not exceeding  $\frac{1}{6}$  of an inch. The whole intestinal canal measures between  $4\frac{1}{2}$  and 5 feet; and the gizzard is decidedly small, not being bigger than that of a common Duck (*Anas boschas*).

## 2. RHODONESSA CARYOPHYLLACEA (Lath.).

*Anas caryophyllacea*, Scl. P. Z. S. 1874, p. 110.

This rare Duck is generally placed in the genus *Anas*; by Mr. Eyton, however, it is considered to belong to the *Fuliginæ*; and that ornithologist puts it, along with *Fuligula rufina*, in the genus *Callichen*. A pair purchased by the Society on the 12th of January last year,

Fig. 4.

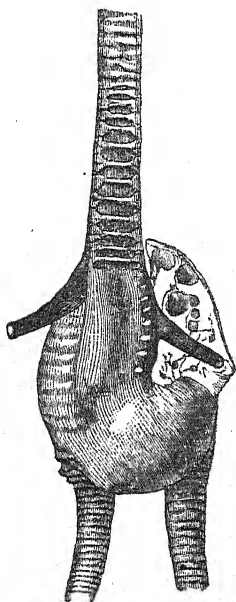


Fig. 5.

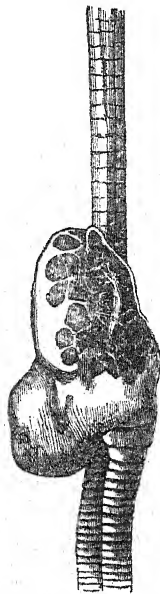


Fig. 4. Lower part of trachea of *Rhodonessa caryophyllacea* ♂ (front view).  
Fig. 5. Ditto (side view).

died, the female on the 11th and the male on the 15th of March, 1874. From these two specimens I was able to remove the windpipes for examination. The structure of the syrinx of the male is in favour of

the Fuliguline affinities of the genus; and the trachea presents points of superficial similarity to that of the last-described bird, *Sarcidiornis melanota*, as will be seen by a comparison of the accompanying drawings (figs. 1-5) of the lower portion of the windpipes in the two. In the female (fig. 3) there is no lateral diverticulum, the syrinx being simple. The lower end of the trachea is hardly contracted at all. There is, however, a slight thinning of the anterior portions of some of the inferior tracheal rings, as in the female of *Sarcidiornis melanota*, though to a less extent—a small, transverse, anterior fenestra being the result. In the *Rhodonessa* the syrinx proper is nevertheless differently constructed, the last five or six tracheal rings being consolidated together, the fenestration being situated higher up; whilst in the *Sarcidiornis* the fenestration of the unanched rings continues as low down as the bronchial bifurcation (*vide* figs. 3, 4, & 5).

In the male *Rhodonessa caryophyllacea* (figs. 4 & 5) the lower portion of the trachea is less capacious than a little higher up, where a slight fusiform dilatation occurs. Above the large syringeal box there are in front 15 transverse fenestræ formed between the thinned tracheal rings, as in the *Sarcidiornis* and *Harelda*. Below them the syrinx is formed by a considerable dilatation in two directions—one to the left, which is the larger and has semimembranous walls; the other slightly to the right, inferior in position to the former. This latter is simply osseous, no fenestræ being present in it; it intrudes upon the right side as well as the left in front. The last 12 or so tracheal rings are considerably dilated and co-ossified, the two above-mentioned compartments being connected with the cavity formed by their fusion through a single left-sided orifice, the left bronchus springing from the membraniform cavity.

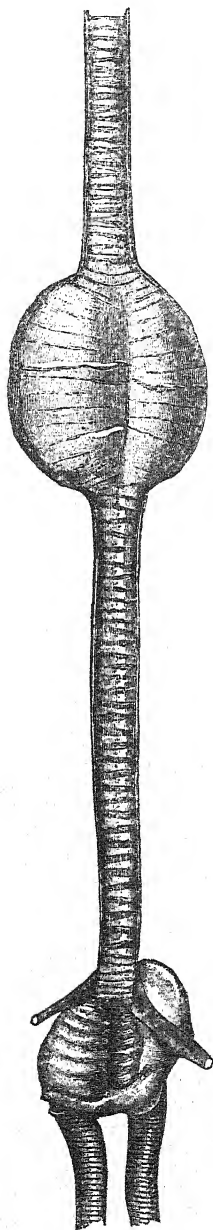
The cæca are not quite equal in size, being  $2\frac{1}{8}$  and  $1\frac{3}{4}$  inches long; the whole intestine measured 4 feet.

### 3. METOPIANA PEPOSACA (Vieill.): Sclater, Rev. Cat. Vert. p. 255.

Of this bird Mr. Sclater mentions\* that "it has a large bulbous expansion in the windpipe." This I have found in all the male specimens which I have examined. Its distance above the bifurcation of the bronchi is best estimated from the accompanying sketch (fig. 6, p. 155) which is of the natural size. A similar tracheal dilatation is to be observed in the male of *Melanitta fusca*, that in *Clangula histrionica* being much less considerable. In a male, purchased on the 6th of July, 1870, which died on the 7th of January last, the syringeal box (see figs. 6 & 7) is constructed on the same type as in *Fuligula rufina* and *F. ferina*, being mostly composed of membrane, with an intersecting, oblique, simple osseous bar running across near the upper margin of its outer side. There is also some dilatation of the consolidated rings, which go to form the lower portion of the trachea; this is to be observed on both the right and left sides, the box being connected with the latter only. In the female no box is developed. The trachea narrows slightly above the syringeal box.

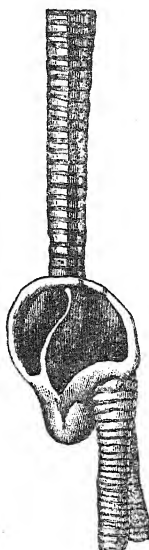
\* P. Z. S. 1868, p. 146.

Fig. 6.



Trachea of *Metopiana peposaca* ♂ (front view).

Fig. 7.



Lower part of trachea of *Metopiana peposaca* ♂ (side view).

The cæca in this specimen were  $5\frac{1}{2}$  and 6 inches in length, the whole intestinal canal measuring  $4\frac{1}{2}$  feet.

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March 16, 1875.

Dr. A. Günther, F.R.S., Vice-President, in the Chair.

The Secretary made the following report on the additions to the Society's Menagerie during February 1875 :—

The total number of registered additions to the Society's Menagerie during the month of February was 146; of which 1 was by birth, 20 were by presentation, 112 by purchase, 6 received in exchange, and 7 received on deposit. The total number of departures during the same period by death and removals was 96.

The most noticeable additions during the month were :—

1. A Peguan Tree-Shrew (*Tupaia peguana*), presented by the Hon. Ashley Eden, C.S.I., Chief Commissioner, Rangoon, British Burmah. This is believed to be the first living *Tupaia* of any species that has reached Europe.

2. A Blanford's Squirrel (*Sciurus blanfordi*), presented by Mrs. Dunn, 8th February. This Squirrel was received in the same cage as the Tree-Shrew, and is so much like it in general external appear-

ance as almost to lead to the idea that we have here a case of mimetic resemblance on the part of the insectivorous mammal.

3. Four Quica Opossums (*Didelphys quica*), a mother and three young, purchased 12th February. These are the first examples of this species we have as yet received.

4. A yellow-lored Amazon (*Chrysotis xantholora*), purchased 26th February; being the first example of this rare Parrot received alive. Mr. Salvin (Ibis, 1874, p. 327) has lately shown that Yucatan is the true habitat of this species. The only specimens of it in this country are, I believe, those in the British Museum, obtained by Mr. Dyson, upon which Mr. Gray based his description. The accompanying figure (Plate XXVI.) will serve to make this species better known. We have likewise a living example of the nearly allied *Chrysotis albifrons*.

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The following communication, addressed to the Secretary by Capt. John Biddulph, dated Government House, Calcutta, Nov. 5, 1874, was read :—

"While we were in Kashgar, numerous specimens of a gigantic wild sheep were brought in from the Thien-Shan range by Colonel Gordon's party. This was taken by us to be the *O. polii*; and a drawing of the animal by Colonel Gordon was sent to the Society, and published in the 'Proceedings' (1874, p. 425, pl. liii.).

"In our trip to Wahhan and back in April and May, numerous specimens of the horns of the *O. polii* were picked up on the Pamir and brought away. Those of our party who had seen the wild sheep alive on the Thien-Shan, pronounced it to be identical with the *O. polii* we saw on the Pamir, though it was remarked by us at the time that the Pamir horns ran larger than the Thien-Shan ones—the latter, on fine full-grown animals, not measuring as a rule over 48 inches from base to tip, measured round the curve, whereas on the Pamir any number of horns averaging from 50 to 60 inches could be picked up; and one head was picked up measuring 65 inches.

"It was not till I arrived in Calcutta that I had an opportunity of seeing the two together, when I was at once struck by the great differences in shape and general appearance.

"After a careful examination of the few specimens available, and the photographed animals of the Thien-Shan, I cannot help coming to the conclusion that they differ sufficiently to warrant the idea that they are distinct animals.

"The accompanying drawings, carefully made to scale, will give a good idea of the two heads.

"The chief characteristic of the *O. polii* head is the bold and elegant sweep of the horns, of which the tips diverge so much in the second curve as to be 48 and 50 inches apart in heads of an average size.

"The head of the Thien-Shan Sheep approaches somewhat in appearance the head of the *O. ammon*, the horns being more massive at the base than the *O. polii*, and not diverging at the points to the

same extent; in fact the second curve is not so decided as in the *O. polii*; but the first curve is much rounder.

"I am therefore inclined to believe that the wild sheep of the Thien-Shan belongs to a species hitherto not described. It certainly is not the *O. ammon* of the Himalayas, as it differs not only in the shape of the horns but also in being of a smaller size, having a longer tail and smaller ears.

"A full description of the Thien-Shan *Ovis* was sent to the Zoological Society with the drawing; but I believe the *O. polii* has never yet been described in the flesh.

"The above opinion is not formed from single specimens, but, directly my attention was called to it, I at once remarked that the characteristic differences held good through all the specimens brought away."

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A letter was read from the Rev. S. J. Whitmee, C.M.Z.S., dated Samoa, South Pacific, Nov. 17, 1874, giving particulars as to the occurrence of the Palolo (*Palola viridis*) on the shores of that island in 1874. In that year these singular worms had appeared on Nov. 1st and 2nd, Samoan time, = Oct. 31st and Nov. 1st by Greenwich date. There were very few on the first day; but the supply was large on the second. Mr. Whitmee had removed the ova, which were well developed, and had endeavoured to hatch them in vessels of sea-water regularly changed, but had only been able to keep them alive four days. Drawings of the ova in different stages accompanied the communication. It would appear, therefore, probable that the periodical appearance of the Palolo in such prodigious numbers might have something to do with its reproduction.

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Mr. Howard Saunders, F.Z.S., exhibited a specimen of a Gull, which he considered referable to *Larus fuscus*, obtained at Magdalena Bay, Lower California, by Mr. Gervaise Mathew, R.N., of H.M.S. 'Resolute,' in November 1873, being the first instance recorded of the occurrence of this species in the New World, and made the following remarks:—

"In colour of mantle, webs of primaries, feet, and in every respect but one, this specimen appears to be identical with *Larus fuscus*. The sole difference consists in this—that in *L. fuscus* the tarsus is, so far as my experience goes, longer than the foot, including the middle toe-nail; but in this Californian specimen the reverse is the case. This may, of course, be an individual peculiarity; and the example in question is certainly much further off from *L. occidentalis*, Aud., than from true *L. fuscus*. In the coloration of the webs of the primaries it does not agree with *L. occidentalis*, a branch of the group which has *L. argentatus* for type, but perfectly coincides with *L. fuscus*, from which it differs in the size of the foot alone."

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The following communications were read:—



1. On the Structure and Affinities of the Musk-Deer  
(*Moschus moschiferus*, Linn.). By WILLIAM HENRY  
FLOWER, F.R.S., V.P.Z.S., &c.

[Received March 16, 1875.]

Almost all our knowledge of the visceral anatomy of the Musk-Deer is derived from Pallas\*. It is nearly a century since his classical work was published; and it does not appear that any other anatomist has had an opportunity of dissecting an animal of the species, the subject which furnished the material for the following notes having been the first which has ever been brought alive to Europe. Its arrival in the Society's Menagerie was thus announced by our Secretary in the 'Proceedings' for May 13th, 1869 :—

"A female Musk (*Moschus moschiferus*), presented by Major F. R. Pollock †, Commissioner at Peshawur, and most carefully conveyed to this country by Lieut. C. H. T. Marshall, F.Z.S., from whom it was received March 31st. This animal had been captured in June 1867, in the hills of Cashmere, by Major Delmé Radcliffe, of the 88th Regiment, who shot both the parents, and brought it when quite a kid to Peshawur. It was now about two years old, and was believed to be the only Musk ever brought to Europe alive."

A very good figure, drawn from the living animal in a characteristic attitude, appeared in the 'Illustrated London News' for April 24th, 1869. I call particular attention to this, as all other published figures of the Musk-Deer appear to have been taken from skins or stuffed specimens, and give but an indifferent idea of the general external appearance of the animal.

It unfortunately died on October 27th of the same year, of pleuropneumonia and acute peritonitis, being then rather more than two and a half years old. All the permanent teeth were in place and the epiphyses of the long bones completely united, though those on the bodies of some of the dorsal vertebræ and on the pelvis were still separable.

The animal measured from the tip of the nose to the root of the tail 33 inches, and (being in an extreme state of emaciation) weighed 14lbs. 8oz. ‡

#### *External Characters.*

Under this heading I have only thought necessary to record such characters as are not readily observed in mounted skins of the animal, which are now tolerably abundant in museums.

\* Spicilegia Zoologica, fasciculus xiii (1779).

† Now Sir Richard Pollock, K.C.S.I.

‡ Since the greater part of the following description was written, a male Pudu (*Cervus humilis*) died at the Society's Gardens; and Mr. Garrod has been so obliging as to forward it for my inspection. I have thus an opportunity of adding some comparisons between the viscera of the Musk and those of another Deer of about the same bulk; for though the former, having longer limbs and neck, has the appearance of being a considerably larger animal, there is but little difference in the size of the trunk.

There was no suborbital gland or crumen\*, no vestige of the abdominal musk-sac of the male†, nor of the gland described by Brandt on the outside of the thigh‡, nor of the tail-glands described by Hodgson§, in both cases in male animals; nor were there any interdigital glands in either feet, the depressed space between the toes, where the glands usually open, being covered with hair||.

The teats were two in number¶, placed on the hinder part of the abdomen, between the thighs, 1 inch in front of the anterior margin of the symphysis pubis,  $3\frac{1}{2}$  inches in front of the vulva, and  $\frac{6}{10}$  inch apart; each was  $\frac{1}{2}$  inch in length, soft, flaccid, slender, cylindrical, slightly tapering, and with a rounded apex. They were placed upon a nearly bare oval space,  $2\frac{1}{4}$  inches across, and 1 inch from before backwards, having only a few long fine silky hairs upon it. The space between this and the vulva was covered with hairs resembling those of the remainder of the abdomen, though softer and finer, especially at the hinder part.

A heart-shaped patch,  $\frac{7}{10}$  inch in diameter, surrounding the vulva, was covered with soft skin, perfectly bare, beset, especially near its margin and anterior portion, with numerous yellowish-white sebaceous glands. Within, but near the front end of this bare place, is situated the prominent conical eminence, formed by the anterior union of the labia, with a few short hairs upon it. Close behind this is the apex of the clitoris, at the anterior margin of the vulval orifice. The extremely short perinæum, the margin of the anus, and the prominences formed by the tuber ischii, were covered with very short, flattened, adpressed hairs, which pass into those which clothe the triangular under surface of the very brief tail. It is not quite correct to describe, as is usually done, the long hairs of the tail as only covering the upper surface and sides of the organ, for they pass under and completely surround the extreme tip. The skin adheres very closely to the end of the very slender, elongated, terminal caudal vertebra.

\* In the Pudu the crumen is a distinct involution of thickened integument, lodged in a deep pit in the bone, with an aperture half an inch in length. The lining membrane is white and corrugated, and has a few short, pointed, black hairs scattered over it. This organ, though generally present in the *Cervidae*, is rudimentary or absent in the Roe and in the South-American Deer of the section *Coassus*. It is also absent in *Hyomoschus* and *Tragulus*.

† For an account of this organ and its peculiar secretion, which constitutes the "musk" of commerce, with references to previous descriptions, see A. Milne-Edwards's valuable memoir entitled "Recherches sur la Famille des Chevrotains," Ann. des Sciences Nat. 5<sup>e</sup> série, tome ii. (1864), which also contains a description of the osteology of *Moschus*, and a short résumé of Pallas's observations on its splanchnology.

‡ J. F. Brandt, "Note sur la découverte d'une glande particulière qui se trouve sur la face extérieure de la cuisse du *Moschus moschiferus*," Bull. Scientif. de l'Acad. d. St. Pétersb. tom. i. 1836, p. 174.

§ B. H. Hodgson, "On a new organ in the genus *Moschus*," Bengal Journal Asiatic Soc. x. 1841, p. 795.

|| In the Pudu there are no distinct pouches in this situation; but the skin in the depression between the toes on the dorsal surface of all the feet is bare, and evidently has a free sebaceous secretion. This may be considered the most rudimentary or earliest stage of an interdigital gland.

¶ In the male Pudu there were four.

The feet of the Musk-Deer, as was well observed while the animal was alive, are remarkable, not only for their size and the great development of the outer hoofs, but also for their freedom of motion and capability of being widely extended and closed again, so that it seemed to have the power of grasping projecting rocky points between its four outspread toes—a power which must be of great assistance in steadying itself in its agile bounds among the crags of its native haunts\*.

*Anatomy of the Oral and Cervical Regions.*

The exposed parts of the crowns of the upper canine teeth were 0''·2 long, conical, compressed, curved, directed inwards and somewhat backwards, with their apices truncated†.

The papillæ lining the cheeks are 0''·15 long, conical, very sharp-pointed, becoming smaller behind. In the floor of the mouth a single row of broad, conical, flattened papillæ, with prolonged and very delicate points, extends on each side of the root of the tongue, reaching backwards nearly as far as the last molar tooth, and forwards to within  $\frac{1}{2}$  inch of the incisors. These were broader and flatter in front, and smaller and more slender behind. The longest measure 0''·1 in length. Near the front of the under surface of the attached part of the tongue were a few similar but smaller papillæ, forming a second (upper) line or series.

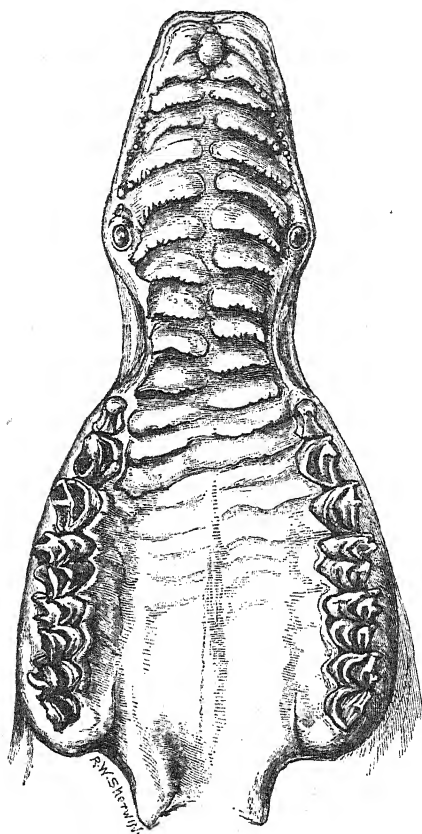
The palate (fig. 1), narrow in front, gradually widens to the canine teeth, where it is 0''·9 across. Between the canines and molars it contracts to 0''·7. Between the first premolar teeth it is 1''·1 and between the last molar 1''·3. The anterior part (two thirds) is covered with callous, retroverted, imbricated elevations, the hinder sharp margins of which are slightly denticulated. These are placed in a double row, one on each side of the middle line, which they touch but scarcely pass across. In the front of the mouth they are arranged in regular pairs; but after the third those of the left side are placed a little in advance of the corresponding right ridges; and at the narrowest part of the palate, behind the canine teeth, they regularly alternate. The most anterior are narrowest from before backwards and most strongly elevated. They become broader as well as flatter behind the canines. Between the premolars they gradually subside, and are finally lost opposite the commencement of the true molar series. Behind this the palate is perfectly smooth. At its anterior extremity in front of these elevations is a smooth surface, having in the middle line a small somewhat hourglass-shaped prominent pad ·2'' long from before backwards and narrower from side to side, bordered on each side by the opening of the duct to the nasal passage.

\* My friend Mr. F. Jeffrey Bell has dissected the muscles of the feet, and intends shortly to give to the Society an account of their structure and arrangement.

† In the old male Pudu there were no signs of upper canines—an exception to the general but by no means universal rule in the *Artiodactyles*, that the tusks are developed in inverse ratio to the frontal appendages.

The number of ridges in front of the first premolar is ten on each side; and five or six may be counted behind; but the last are very indistinct. The soft palate extends about an inch behind the last molar, roofing over a portion of the fauces, which is much contracted and tubular, and ends by a straight sharp border.

Fig. 1.



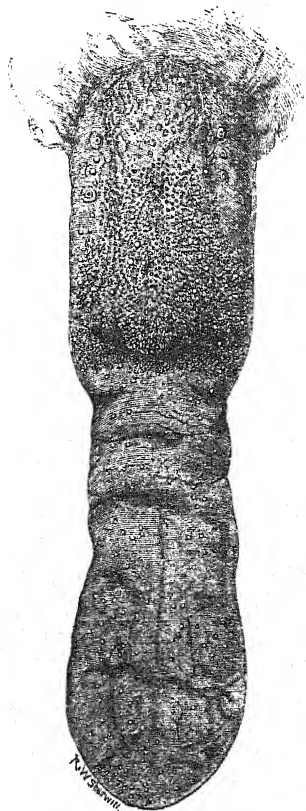
The palate, natural size.

The general form of the palate differs from that of the Roe, and more resembles that of *Tragulus* in the widening opposite the canines, evidently in relation with the great development of these teeth in the male. It also differs from the Roe and approaches *Tragulus* in the ridges being less regularly placed and less strongly imbricated and denticulated. In the last-named animal the ridges, though strongly

marked, are, as in the *Suina*, neither overlapping nor toothed on the edge\*.

The tongue (fig. 2) is  $4\frac{1}{2}$ " long, narrowest (0".8) at the middle, rather spatulate, widening to 1" near the front, and terminating by a rounded depressed apex. In the anterior third there is a faint median depressed line. Posteriorly it presents the usual intermolar elevation.

Fig. 2.



Dorsal surface of tongue, natural size.

Minute conical filiform papillæ cover the whole dorsal surface, except quite at the base. These are much larger and further apart on the posterior median elevation than elsewhere. Small, white, circular, fungiform papillæ are pretty regularly scattered over the surface; and posteriorly, close to the lateral margin of the dorsum,

\* In the *Pudu* the ridges of the palate are more developed and more strongly toothed than in *Moschus*, and therefore more typically Cervine, but they are less regular than in the *Roe*.

where the other papillæ are becoming few and small, is on each side a longitudinal row of five rather small circumvallate papillæ, not quite symmetrically disposed and slightly converging posteriorly\*. The tongue is attached in front,  $\frac{3}{4}$  inch behind the incisor teeth, by a soft broad fold of membrane without any distinct frænum.

The parotid gland is large and straggling, composed of loosely connected acini. It extends from the angle of the jaw,  $1\frac{1}{2}$  inch backwards and upwards to the top of the neck behind the ear, a small slender branch projecting forwards and upwards in front of the cartilaginous meatus. The duct leaves the most inferior part of the gland below the angle of the jaw, passes upwards obliquely across the horizontal ramus with the facial artery and vein one inch in front of the angle, and at first following the anterior border of the masseter muscle, then running forwards, enters the mouth quite at the upper part of the cheek opposite the third premolar tooth. An oval patch of buccal glands, nearly an inch from before backwards, is situated in the cheek, around and chiefly below the entrance of the parotid duct.

The submaxillary gland lies immediately below the parotid. It is also very large and with large acini, but of more compact form, being triangular, the shortest side or base of the triangle ( $1''\cdot3$  long) being turned backwards and lying against (for its upper half) the transverse process of the atlas. The apex (distant 2 inches from the middle of the base) lies beneath the horizontal ramus of the jaw. The upper border is in contact with the digastric muscle, the lower border with the sterno-hyoid. The gland lies immediately upon the larynx, with the sterno-thyroid, thyro-hyoid, and the constrictors of the pharynx. A small, detached, oval, glandular piece lay on the upper border of the posterior belly of the digastric muscle, on the right side only. The duct leaves the inner surface of the gland,  $\frac{3}{4}$  inch behind the apex, passes outside the central tendon of the digastric muscle (*i. e.* between it and the ramus of the jaw), then crosses beneath it and runs forward, surrounded by the long sublingual gland (3 inches in length), to open quite at the fore part of the floor of the mouth, beneath one of the before-mentioned papillæ,  $\frac{1}{4}$  of an inch behind the incisor teeth.

The tonsillar glands open by a pair of large distinct orifices, one in front of the other in the usual situation, without any elevation. The œsophagus is lined with very dense epithelium thrown into longitudinal rugæ.

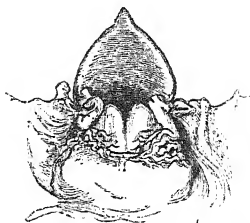
The larynx did not appear to present any thing specially to distinguish it from that of other Deer. The epiglottis (fig. 3) is triangular, with a pointed apex†.

\* The arrangement of the circumvallate papillæ thus agrees with the *Cervidæ*, and differs entirely from that of *Tragulus* and *Hyomoschus* (see P. Z. S. 1867, p. 955).

The tongue of the Pudu is rather shorter and thicker than that of the Musk-Deer, and not so spatulate at the anterior extremity. The papillæ are similarly arranged; but the fungiform are more conspicuous, especially on the intermolar elevation; and in the middle of the tongue, near the front, they are conical and recurved, though at the apex and sides perfectly circular in outline.

† In the Pudu the epiglottis has a rounded free border. In the Wapiti it is bifid.

Fig. 3.



Epiglottis and opening into larynx, natural size.

The thyroid body is much flattened and oval and of very loose texture, extending from the top of the first tracheal ring to the bottom of the eighth, 0''·8 long and 0''·4 across at the thickest part.

The number of rings in the trachea, above the part where the branch to the upper right lobe of the lung is given off, is 49, between this branch and the bifurcation 11; total 60\*. Some of the rings are single at one side and bifurcated at the other; thus the third ring is single on the left and double on the right side, and the succeeding ring has the opposite arrangement. These double rings have been counted as two in the enumeration given above.

#### *Thoracic Viscera.*

The hinder margin of each lung is entire. The lower lobes are nearly equal in size (the left slightly the largest), of the usual triangular form, being divided off from the rest of the organ by a nearly horizontal fissure, which does not extend quite to the root of the lung behind, though further on the right than the left side. Near the upper part of the inner border of the right lobe, attached by a narrow neck, is the so-called "azygos lobe" (fig. 4, *A*) deeply fissured on its anterior surface.

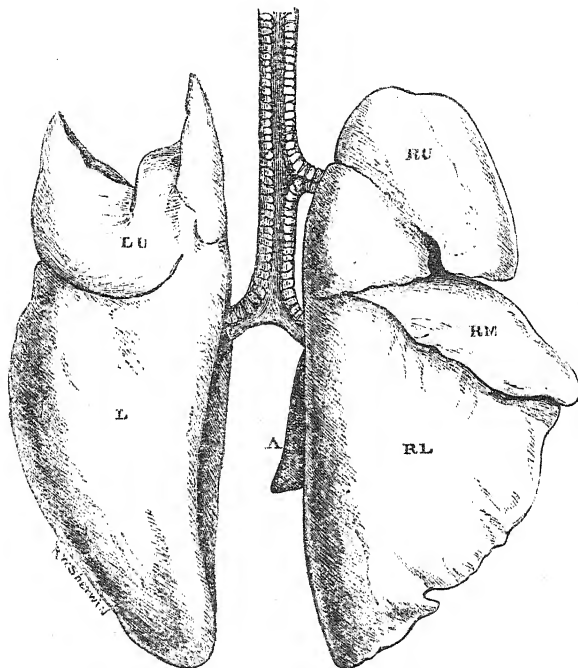
Above the horizontal fissure the arrangement on the two sides is very different. On the right side there are two distinct lobes, the cleft between them extending almost to the root of the lung; the upper one (*R U*) roughly triangular, with the apex upwards and supplied with air by the upper branch of the trachea. It is constricted across its middle into an upper and lower portion. The lower one, or middle right lobe (*R M*), is tongue-shaped, with its apex directed forwards, and while connected at its base with both the upper and lower lobes, it receives its main supply of air from a branch from the principal right bronchus.

The upper portion of the left lung consists of a single lobe (*L U*), but with a short cleft on its anterior border, dividing it partially into a long, narrow, tongue-shaped, inferior portion, with the apex projecting forwards and corresponding to the middle lobe of the right side

\* In the Pudu the number of rings of the trachea is almost exactly the same as in *Moschus*. I counted fifty above and ten below the upper right bronchus.

(though rather smaller), and an upper triangular portion, very much smaller than the right upper lobe\*.

Fig. 4.



The lungs, posterior aspect; half natural size.

LU, left upper lobe; L, left lower lobe; RU, RM, and RL, right upper, middle, and lower lobes; A, azygos lobe.

The heart (fig. 5) is an elongated cone in form, measuring  $2\frac{1}{2}$ " in length,  $1''\cdot9$  from side to side at greatest breadth, and  $1\frac{1}{2}$ " from before backwards when undistended.

A single common anterior arterial trunk is given off from the aorta at its commencement. After a course of  $1''\cdot3$  in length, and having a diameter of  $0''\cdot27$ , this gives off the left brachial (LB) from which the left vertebral is derived (LV). About a quarter of an inch beyond, the right brachial (RB) comes off; and immediately after, the trunk bifurcates into the two common carotids (RC and LC). The right vertebral (RV) is given off from the innominate trunk behind the origin of the right subclavian†.

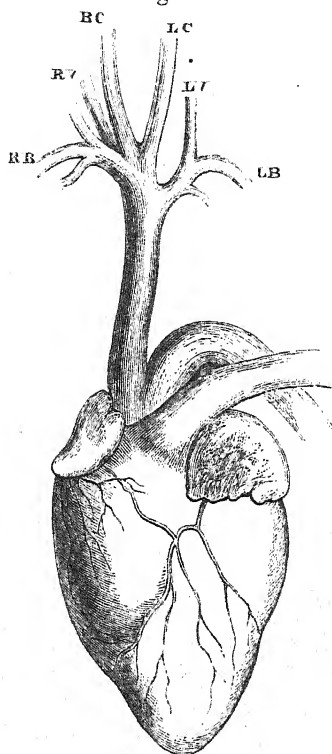
\* The lungs of the Pudu have the same general arrangement as those of *Moschus*; but the right middle lobe is very little divided from the right lower.

† In the Pudu, the anterior aortic trunk proceeds for  $0''\cdot9$ , then gives off the left brachial, then after a further course of  $0''\cdot5$  gives off the right brachial and



Measurements of the red corpuscles of the blood gave an average diameter of  $\frac{1}{7000}$  of an inch, or about the same as those of the Brocket-Deer (*Cervus nemorivagus*), and considerably larger than those of any *Tragulus* yet examined\*.

Fig. 5.



The heart and origin of the great arteries, two thirds natural size.

*R B*, right brachial; *R V*, right vertebral; *R C*, right carotid; *L C*, left carotid; *L V*, left vertebral; *L B*, left brachial.

#### *Abdominal and Pelvic Viscera.*

The dissection of the abdominal viscera was somewhat interfered with by the extensive peritonitis which had prevailed shortly before death, all the intestines being glued together by effusion of lymph. On opening the cavity the liver was found to be entirely concealed

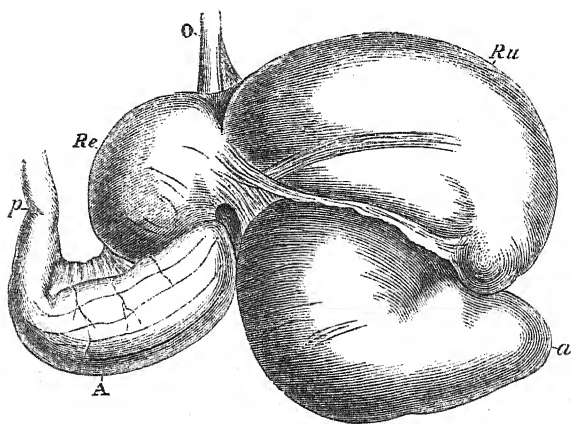
continues for a shorter distance before it bifurcates into the carotids. The vertebrals are given off from the brachials before the internal mammary. The arrangement, therefore, is the same in principle as in the Musk.

\* See G. Gulliver, "On the size of the Red Corpuscles of the Blood of *Moschus*, *Tragulus*, &c.," P. Z. S. 1870, p. 92.

beneath the cartilages of the right ribs, scarcely passing beyond the middle line. Next appeared a small portion of the abomasus emerging from beneath the edge of the liver and passing across to the left side. Beyond this and occupying all the middle part of the cavity from side to side was the large paunch, extending to within  $4\frac{1}{2}$  inches of the symphysis pubis. The spleen, attached along the left side of the paunch, close to its cardiac orifice, could be seen at the diaphragmatic end of the cavity; and the left kidney projected from behind the edge of the paunch near its hinder end. The portion of the cavity between the paunch and the pubis was filled up superficially by the coils of small intestines. The great omentum descending from the inferior border of the abomasus, extremely thin and delicate and entirely without fat, passed over the right side of the paunch and small intestines to within 2 inches of the symphysis pubis.

The stomach resembles generally the figure given of it by Pallas, except that the psalterium is not so large as there represented. The drawings of the anterior and posterior surface (figs. 6 & 7), taken after it was removed from the body and moderately distended, are

Fig. 6.



Anterior or ventral aspect of the stomach, one fourth natural size.

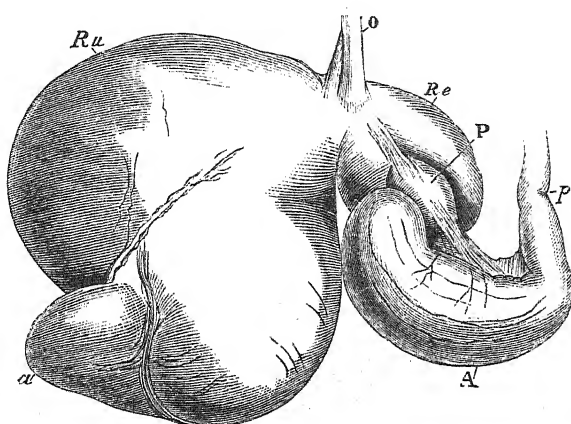
*O.* oesophagus; *Ru*, rumen; *a*, its distal apex; *Re*, reticulum;  
*A*, abomasus; *p*, pylorus.

more correct. The coats of the organ throughout are very thin compared with those of other ruminants which I have examined. How far this might have been an individual peculiarity, or a consequence of the morbidly emaciated state of the animal, I do not know.

The rumen, or paunch (*Ru*), is about 8 inches in transverse diameter. It has the usual form, divided by an oblique constriction

into an upper and lower cavity; or perhaps it can be more correctly described as an elongated conical pouch, folded sharply on itself in a sigmoid manner, with constrictions projecting into the interior, at the inner bends of the folds. The lowest constriction, situated on the left border of the organ, is deep, and the projecting pouches above and below it very distinct; and their apices, having different directions, cross each other, the upper one projecting forwards, and the lower or larger one (the fundus or distal end of the whole cavity, figs. 6 & 7, *a*) turning backwards.

Fig. 7.



Posterior or dorsal aspect of the stomach, one fourth natural size.

O, œsophagus; Ru, rumen; *a*, its apex; Re, reticulum; P, psalterium; A, abomasus; *p*, pylorus.

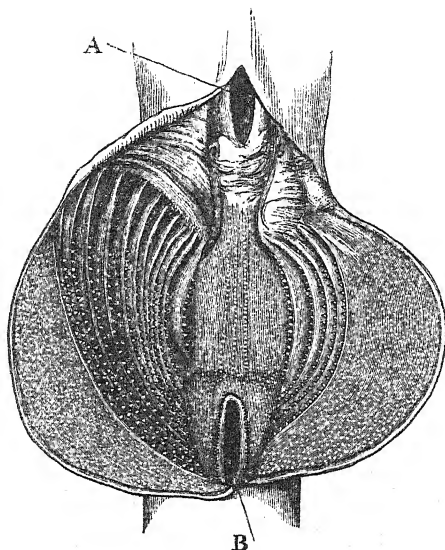
The villi lining the interior of the rumen are slender and cylindrical and very slightly clavate. They nowhere exceed 0".15 in length, and are largest at the anterior and lower part of the upper pouch. As usual, they are exceedingly short, though not absent, on the edges of the projecting ridges, and over certain points become very fine and sparsely scattered, as on the posterior surface, a little way above and below the constriction, in two rather distinct patches at each place, and more especially at the apex of the lowest or terminal pouch. On the middle of the anterior surface, immediately above the constricting band, where this is subsiding at its left extremity, is a small oval orifice,  $\frac{1}{10}$  inch long, placed transversely, leading into a little (apparently) glandular pouch in the walls of the stomach. The diminished size and concentric arrangement of the villi immediately around this opening evidently show that it is a natural structure.

In the *reticulum* (Re), the ridges enclosing the polygonal spaces

are extremely shallow; they, as well as the intermediate spaces, are thinly beset with small sharp-pointed papillæ.

The *psalterium* (*P*) is externally 1".7 long and 1" wide, of the usual flattened oval or, more properly, kidney-shaped form. It contains within (fig. 8) nineteen deep crescentic lamellæ, symmetrically

Fig. 8.



The interior of the psalterium, longitudinally opened along the anterior surface, natural size.

*A*, the opening from the œsophagus; *B*, the orifice leading to the abomasus.

arranged, the largest, or those at the centre of the free convex border of the cavity,  $\frac{1}{2}$  an inch in height, their free edges all projecting equally, and, unlike those of Ruminants generally, without any intermediate shorter lamellæ. The lateral surfaces and edges of the lamellæ are thinly covered with small conical tubercles; but the bottom of each interspace is quite bare. This cavity communicates with the next by a distinct circular orifice .3" in diameter\*.

The *abomasus* (figs. 6 & 7 *A*) is of quite the usual form. Its lining membrane presents parallel, narrow, but much elevated, longi-

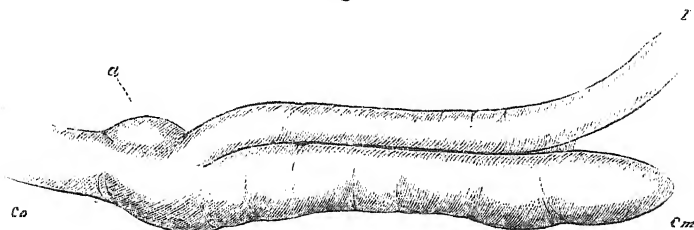
\* The description of the psalterium of the Musk-Deer by Pallas differs so much from the one given above, that I think it is desirable to insert it here, that the attention of future observers may be directed to the subject.

"*Psalterium* reniforme, chymo sicco suffertum et durum in omnibus inveni. Intus foliatum est, lamellis totius cavi fere latitudinem occupantibus, lunatis, 23 ad 25, præter accessorias plicas exiguas. Laminæ omnes duriusculæ, punctis acutissimis utrinque scabræ, ut trituentes diceret, solis cornibus extremis glabræ; cæterum confertim parallelæ, chymo sicco incrustatæ. Inter majores laminas rugæ intercalares, vel lamellulæ accessoriæ angustiores."

tudinal ridges or folds, about twelve in number, beginning at the fundus (which projects beyond the opening from the psalterium) and gradually subsiding towards the pylorus\*.

The small intestine was of nearly uniform diameter,  $\cdot 4''$  inch, when filled with water, and when unravelled 23 feet in length. The colon, when disengaged from its spiral coils, was 13 feet in length, making a total intestinal length of 36 feet, or about thirteen times the length of the animal from snout to root of tail. The colon, commencing at 1 inch in diameter, gradually and slightly increased for the space of 3 feet, then contracted rather suddenly to about half that diameter, and so continued until 2 feet from its termination, where it gradually dilated into a capacious rectum. Its walls throughout were thin and smooth†.

Fig. 9.



The caecum, half natural size.

I, ileum; Co, colon; Cm, apex of caecum; a, glandular pouch at commencement of colon.

The caecum (fig. 9) was 6" long and  $\frac{3}{4}''$  in diameter, straight, cylindrical, obtusely pointed at the extremity, with very thin coats. The ileum enters very obliquely and is bound closely to it by a mesenteric

\* The stomach of the Pudu, in general form and in the size of its compartments, both absolute and relative, closely resembles that of the Musk-Deer; but its walls are considerably thicker and its epithelium lining more developed. In the *rumen* the villi are not only longer but thicker and more distinctly clubbed, so that they lie close together, completely concealing the intermediate surface from which they grow, which is not the case in the Musk-Deer. In the *reticulum* the divisions between the spaces are nearer together, more pronounced, and beset with more numerous and coarser papillae. The *psalterium* is almost of exactly the same size as in the Musk-Deer, but differs greatly in structure, inasmuch as the lamellae (as in most Ruminants) are of two kinds, large and small alternating; indeed, in the interspaces are very short ridges, which might be said to constitute a third or smallest order of lamellae. Excluding the latter, the lamellae are altogether of the same number (19) as in the Musk. In accordance with the general character of the lining membrane of the stomach, the papillae covering them are larger and coarser than in the latter. The *abomasus* differs in the greater thickness of its lining membrane, and the irregularity or even reticulating character of the ridges.

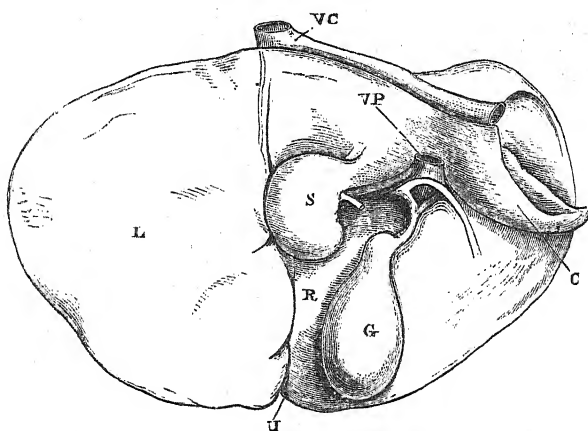
In a *Gazella dorcas* dissected at the same time, the *psalterium* was rather smaller than in the Musk, and its lamellae less developed, being smaller and somewhat irregular, but without any distinct alternation of small and large plates. The bottom of the intermediate surface, as well as the sides and edges of the plates, were covered with pointed papillae.

† The colon of the Pudu forms a very simple helicine coil, composed of two complete circles in one direction and of two in the other.

band to within an inch of its termination. The attached border of the colon immediately beyond the ileo-cæcal valve has an oval dilatation, 0''·8 in length and 0''·6 in breadth, with thickened glandular walls, which Pallas compares to the similar but more marked glandular dilatation in the *Leporidae*, and which, as he says, he has observed in no other ruminant\*.

The pancreas is flat, broad, of irregular outline, and of loose texture.

Fig. 10.



Under surface of liver, half natural size.

L, left lobe; R, right lobe; S, Spigelian lobule; C, caudate lobe; VC, vena cava; VP, vena portæ; G, gall-bladder; U, umbilical fissure.

The liver (fig. 10) presents the usual simple form of that of the Ruminants†. Its general outline is an irregular oval, 6''·2 in extreme breadth and 3''·7 in depth. Its diaphragmatic surface shows only the well-marked umbilical fissure about an inch in depth, and dividing it into right and left segments, of which the former does not greatly exceed the latter in size. Extending from the bottom of the fissure to the posterior or attached border, the delicate suspensory ligament (so often completely atrophied in Ungulates) is distinctly seen. There are no traces of lateral fissures. On the under surface the left lobe is simple, with a thin nearly semicircular free edge. The right is much thickened at its posterior border, and has attached to it very distinct Spigelian and caudate lobes. The former, represented in most Ruminants by a mere smooth tract, has attached to it a flattened quadrate

\* In the Pudu the cæcum is not quite so long and of greater diameter than in *Moschus*, being 5" in length and 2" in breadth. It has the usual obtusely ended cylindrical form, and wants the dilatation at the commencement of the colon observed in the Musk.

† See "Lectures on the Comparative Anatomy of the Organs of Digestion of the Mammalia," Medical Times and Gazette, Sept. 21st, 1872.

lobule, connected with the rest of the lobe by a narrow neck arising from its right anterior corner and overhanging the portal fissure. The caudate lobe is narrow, tongue-shaped, with its pointed tip extending just beyond the border of the right lobe. There is no cystic fissure on the edge of the lobe, but a very well-marked fossa on its surface, in which lies a wide pyriform gall-bladder, the form of which and the arrangement of the hepatic and cystic ducts are shown in the figure. The common bile-duct, after a course of 2 inches, passes, somewhat dilated, for  $\frac{1}{2}$  inch through the intestinal wall and opens by a wide aperture guarded by a semilunar fold\*.

The spleen is attached to the left side of the paunch, close to the cardiac orifice. It is much flattened,  $3\frac{1}{2}$ " long and 2" broad, obtusely pointed at its upper and truncated at its lower end†.

The kidneys are simple and smooth externally. The right kidney is placed so much in advance of the left that its hinder end is on a level with the anterior end of the former. It is also slightly larger than the left, and more regularly kidney-shaped and flatter. The left is thicker from before backwards, narrow at the front end. The dimensions of the right kidney are—length 1"·85, breadth at middle 1"·2, thickness 0"·95; of the left—length 1·75", breadth at middle 1"·1, thickness from before backwards 1"·1.

The suprarenal bodies are close together, the right being in contact with the corresponding kidney, lying on its inner border between the anterior extremity and the hilus, the left being  $\frac{3}{4}$  inch in advance of the left kidney. Each body is flattened, oval, or somewhat reniform, about 0"·5 long and 0"·3 broad; the left slightly larger than the right‡.

The ovaries are small, flattened, pisiform bodies, 0"·25 in greatest diameter. The vagina and uterus have the usual characters seen in unimpregnated female Ruminants§.

\* The liver of the Pudu is slightly smaller than that of *Moschus*; it is more extended transversely, and differs mainly in the greater size and more quadrate form of the caudate lobe, the total absence of any pedunculated Spigelian lobule (as in most if not all other Deer), and the absence of a gall-bladder. There is no suspensory ligament.

† The spleen of the Pudu is much flattened and of nearly circular outline, though rather narrower and thicker at the upper than the lower end. Its diameter averages 3 inches.

‡ The kidneys and suprarenal bodies of the Pudu closely resemble those of the Musk in form and situation.

§ According to Pallas, the male Musk has Cowper's glands, and a small filiform termination (6 lines in length) to the glans penis.

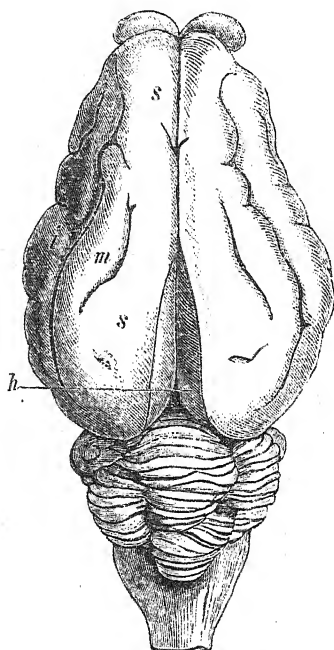
In the Pudu the vasa deferentia are enlarged and flattened for the last inch of their course, attaining a width of a quarter of an inch. The prostate consists of two nearly globular lobes, each of about the size of peas, and a smaller middle lobe placed at the union of the vasa deferentia. The walls of the "membranous urethra" are very thick. Contrary to what obtains in Deer generally, there is a pair of Cowper's glands with a thick muscular covering, also about the size of peas, but somewhat flattened and triangular in outline. The penis is large and thick, and the glans fleshy and conical, without any terminal prolongation.

It may be mentioned that in *Hyomoschus*, Cowper's glands are well developed, the penis is long and slender, and, as in Pigs, has a spiral or corkscrew-like termination.

*The Brain.*

The brain presents the usual characters of that of an ordinary Deer (*Cervus mexicanus*, Mus. Roy. Coll. Surg. no. 1328 E a, was the species with which I compared it most closely), but, in accordance with its smaller size, much reduced in complexity of surface indentations. A natural group like the *Cervidae*, containing animals varying much in dimensions, is well adapted to demonstrate how closely the amount of convolution bears relation to the bulk of the hemisphere, the primitive pattern being exactly the same in all. The

Fig. 11.



Upper surface of brain, natural size.

s s, superior external gyrus; m, middle external gyrus; i, inferior external gyrus; h, hippocampal gyrus.

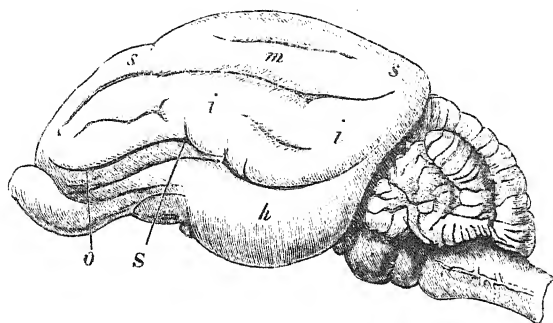
brain of *C. tarandus* (Mus. Roy. Coll. Surg. no. 1328 E) is far more abundantly supplied with secondary surface-windings (even so as very much to obscure the general outline of the pattern) than is that of *C. mexicanus*. The latter and *C. dama* (Leuret & Gratiolet, 'Anat. Comp. du Système Nerveux,' pl. x.) are almost exactly alike. *C. capreolus* (ibid.) is more simple, and *Moschus moschiferus* still more so.

The most obvious division of the external surface of the hemisphere is into three longitudinal tracts. The lowest (*h*), continued from the



olfactory bulb in front, dilates to form the smooth "temporal lobe," and, curving upwards and inwards, appears on the internal surface of the hemisphere, and passes above the corpus callosum to the anterior extremity of the organ. In this part of its course it is bounded above by the "calloso-marginal sulcus" (Huxley). This gyrus I have previously spoken of as "hippocampal," because the hippocampus major is formed by the sulcus on its concave surface\*. Above this, and separated from it by a very distinct horizontal sulcus, is a broad tract (*i*), extending from the front to the back of the brain, of nearly equal width throughout. Rather in front of the middle of this is

Fig. 12.



External surface of brain, natural size.

*s s*, superior external gyrus; *m*, middle external gyrus; *i i*, inferior external gyrus; *h*, hippocampal gyrus; *S*, Sylvian fissure; *O*, supraorbital sulcus.

the very insignificant Sylvian fissure (*S*), anterior to which a longitudinal sulcus (*supraorbital*, *O*) marks off, as in the Carnivora, a narrow strip, the supraorbital gyrus of Leuret, which in *Proteles* appears to be the reflected commencement of the superior gyrus, but in the Deer looks more like a dismemberment of the inferior outer convolution.

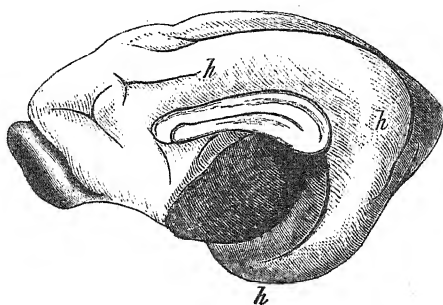
The remainder of the outer surface of the hemisphere is occupied by a tract, broad behind and narrow in front (*s m s*), extending the whole length of the hemisphere. In the simpler form of brains of the group this might be considered a single convolution; but already in *Moschus* a longitudinal fissure towards the posterior end separates two tracts, which become so marked in the larger species that Leuret considers them two distinct gyri (*s* and *m*). However this may be, they always become confluent towards the anterior part of the brain.

As regards the convolutions, then, the brain of *Moschus* is essentially a simplified (because small) Deer's brain. There is, however, one point of importance in which it differs from the other Deers' brains examined; and that is the very high position of the calloso-marginal sulcus, which in its posterior half becomes visible on the

\* "Anatomy of *Proteles*," P. Z. S. 1869, p. 479.

upper surface of the brain, together with a narrow strip (fig. 11, *h*) of the internal or hippocampal gyrus. In the Mexican Deer the sulcus certainly rises quite to the upper edge of the internal surface of the hemisphere; but neither in this species nor in the Roe (according to Leuret's figure) is any part of the hippocampal gyrus exposed near the middle line. What makes this character interesting is

Fig. 13.



Internal surface of cerebral hemisphere, natural size.

*h*, hippocampal gyrus.

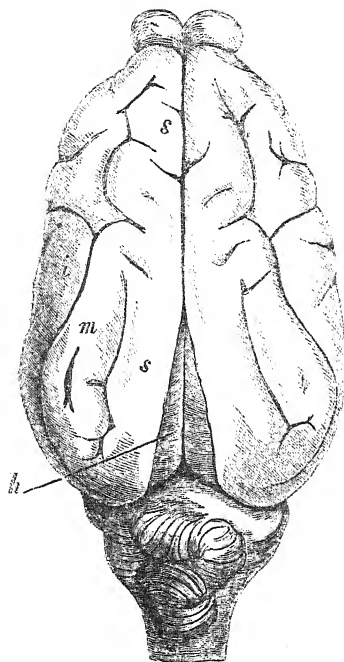
that in *Tragulus* it is present even to a greater degree, the hippocampal gyrus bordering the posterior half of the great longitudinal fissure forming a prominent feature in the upper surface of the brain. In other respects the brain of *Tragulus*, as far as its surface-markings are concerned, is a simplified miniature of that of the *Cervidæ*. The inferior external longitudinal convolution is distinctly marked from the superior; but the latter has scarcely a trace of a division into two, though at first sight the abnormal position of the calloso-marginal sulcus might be taken for one. Whether this is any special evidence of affinity between *Moschus* and *Tragulus*, cannot be decided until the brains of other small species of *Cervidæ* have been examined. In the mean time, I can only point it out and await future opportunities of investigation. The comparison of cerebral convolutions as evidence of affinity is a subject in which, without very careful or extended research upon ample materials, the investigator is apt to be led astray, but one which, under favourable conditions, may lead to valuable results\*.

\* The opportunity of examining the brain of the Pudu Deer has afforded the means of solving the question stated above. It is slightly larger, both relatively and absolutely, than that of the Musk, as the following dimensions show:—

	<i>Moschus</i> <i>moschiferus</i> ♀	<i>Cervus</i> <i>humilis</i> ♂
Length of skull from front of præmaxillæ to occipital protuberance .....	6.1	5.8
Length of cerebral hemisphere .....	2.1	2.4
Greatest breadth of cerebral hemispheres .....	1.7	1.8

It is chiefly distinguished by the greater breadth of the frontal lobes (see

Fig. 14.

Upper surface of brain of Pudu Deer (*Cervus humilis*), natural size.

Letters as before.

*The Skeleton.*

The skeleton of *Moschus* has been described by A. Milne-Edwards, though somewhat briefly except as regards the skull. I will only add a remark upon the number of the ribs. He says :—"D'après Pallas, le nombre des paires de côtes varierait de 14 à 15 ; tandis que chez les Cerf leur nombre est ordinairement de 13, bien qu'on trouve (chez le Renne, par exemple) parfois 14." In the skeleton which

fig. 14); the general arrangement of the sulci is the same ; but they are somewhat more complex, almost equalling in this respect those of the Roe. It differs, however, from the latter (if Leuret's figure can be trusted) in the greater breadth of the anterior part of the superior gyrus, and especially in the appearance of a considerable-sized strip of the internal or hippocampal gyrus on the upper surface of the hemisphere bordering the hinder part of the great longitudinal fissure, exactly as in the Musk-Deer. This character thus forms no special approximation to the *Tragulina* in the last-named animal, but is probably common to all the smaller *Cervidae*. The chief characteristics of the brain of the Musk, as distinguished from the other members of the family to which it belongs, are the simplicity of the surface-markings and narrowness of the anterior lobes—indications of a lower or more primitive type.

has been so long mounted in the Museum of the College of Surgeons there are certainly 14 ribs ; but in two others presented by Mr. Bryan Hodgson there are but 13, which is the number in the female subject of the present notice. It is curious that if *Moschus* sometimes varies in excess of the number of ribs usual to the *Cervidæ*, *Hydropotes* differs in the opposite direction ; for the fine skeleton of a male of that species lately presented to the Museum by Mr. Swinhoe has but 12 pairs.

*Systematic Position and Affinities of Moschus.*

Although, in consequence of imperfect knowledge or imperfect reasoning upon such knowledge as we possess, a large portion of our present system of zoological classification can only be looked upon as tentative and provisional, there are certain conclusions which we have good reason to believe no future discoveries will ever change, and upon which we can therefore take our stand and say they are questions of fact and not of opinion.

One such is that the Paridigitate Ungulates of Cuvier (the ARTIODACTYLA of Owen, the "Bisulques" of Gervais) form a definite natural group, all the members of which are more nearly related to each other than they are to any other mammals. Of no large group do we know the past history so thoroughly ; and our knowledge of it has enabled us to fill up almost every important link since the middle of the Eocene epoch, and to show the gradual steps by which its different modifications have been brought about\*.

Another fact which I think indisputable is that, by the extinction of the various intermediate forms, four distinct modifications of the original Artiodactyle type have been left at present inhabiting the earth's surface, which are the *Suina* (including the Pigs and Hippopotamus), the *Tylopoda*† (the Camels and Llamas), the *Tragulina*‡ or Chevrotains, and the true Ruminants (called also *Pecora* and *Cotylophora*).

\* Our present state of knowledge on this subject has been very ably and ingeniously expounded by Dr. W. Kowalevsky in his "Monographie des genres *Anthracotherium*, Cuv., und Versuch einer natürlichen Classification der fossilen Huftiere," *Palæontographica*, xxii. 1873. An abstract will be found in a paper by the same author "On the Osteology of the *Hyopotamidae*," *Proc. Roy. Soc.* vol. xxi. p. 147, 1873.

See also W. H. Flower, "On Palæontological Evidence of Gradual Modifications of Animal Forms," *Proceedings of the Royal Institution of Great Britain*, April 25th, 1873.

† Illiger, 'Prodromus,' 1811. *Phalangigrada* and *Digitigrada*, proposed subsequently, have no advantage over the earlier name.

‡ The known members of this group, constituted of the genera *Tragulus* and *Hyomoschus*, are so closely allied as to form a single family, which, according to the most convenient rules of zoological nomenclature, would be called *Tragulidæ*; but I use the above termination as implying that they constitute a zoological division of more than family importance, equivalent, in fact, to the three others mentioned above. Although the French word *Chevrotain* and the Latin *Tragulus* may have had originally nothing to do with these animals, it is very desirable, in default of any better designation, to keep them for their exclusive use, and never for the future to allow such unfortunate expressions as "Pigmy Musk-Deer" to remain to convey false notions of zoological affinities.

Any system of classification which ignores these facts cannot pretend to be founded upon the teaching of nature.

There has scarcely been a more troublesome and obdurate error in zoology than that which, based on the observation of certain comparatively unimportant external characters, placed the *Tragulina* and *Moschus* in one and the same genus\*. It has been troublesome not only as preventing a just conception of the relations of existing Artiodactyles, but also in causing great confusion and hindrance in palæontological researches among the allied forms; and most obdurate, inasmuch as all that has been recently done in advancing our knowledge of both groups has not succeeded in eradicating it, not only from nearly every one of our zoological text-books, either British or continental, but even from works of the highest scientific pretensions.

In the admirable memoir of Adolphe Milne-Edwards already referred to, which contains so much solid information about the Musk-Deer and the *Tragulina*, and in which the distinctions between them are so clearly pointed out, the influence of the old traditions prevailed; and in his final revision of the order of Ruminants (p. 118) the *Tragulidæ* constitute only one of the families of the suborder Unguligrada, the *Moschidæ*, *Cervidæ*, *Antilopidæ*, *Capridæ*, *Bovidæ*, and *Girafidæ* (so far more closely allied to one another) being the others, while the Camels are separated as a distinct suborder, Phalangigrada.

In a later work, however, published by the same eminent zoologist in conjunction with his illustrious father ('Recherches pour servir à l'histoire naturelle des Mammifères,' 1868), in the preliminary sketch of the classification of the Mammals, a complete reformation is made, *Moschus* being included among the *Pecora* or ordinary Ruminants, while the "*Chevrotains proprement dits*" constitute an order apart, called "*Tragulides*," placed between the former and the "*Pachydermes bisulques*."

Whether or not we give the term "order" to these groups† matters less than that we recognize their natural character, and feel satisfied that the wide separation thus made between animals formerly thought to be so closely allied is justified by our increased knowledge of their structure. I will therefore endeavour, more fully than has hitherto been done, to give the reasons upon which this view is based, which will be the first step necessary for defining the position of *Moschus*.

\* *Moschus* and *Tragulus*, previously used as synonyms, were first separated by Dr. J. E. Gray, in 1836 (P. Z. S. vol. iv. p. 63), as sections or subgenera of the genus *Moschus*; but the importance of their distinguishing characters was not recognized, as *Memminna* was made another section of equal rank. Pucheran first proposed to place *Tragulus* in a family apart from *Moschus*, chiefly on account of the different structure of the stomach ("Monographie des espèces du genre Cerf," Compt. Rend. de l'Acad. des Sciences, 1849, t. xxix. p. 773, and Archives du Muséum, 1852, t. vi. p. 285).

† I think myself that this application of the term is hardly consistent with its general use among the other Mammalia, and that "suborder" would be preferable.

In the following characters *Moschus* agrees entirely with all the *Pecora* and differs from the *Tragulina*.

1. The placenta is cotyledonous\*, whereas in the *Tragulina* it is diffuse, as in the *Suina* and *Tylopoda*.

2. There is a complete psalterium or third cavity to the stomach.

3. The left brachial artery arises from a common innominate trunk, instead of coming off separately from the aortic arch as in *Tragulina*, *Tylopoda*, and *Suina*†.

4. The odontoid process of the second cervical vertebra is in the form of a crescent hollow above, instead of being a conical tuberosity as in *Tragulina* and *Suina*.

5. The auditory bulla is simple and hollow within, instead of being filled with cancellated tissue as in *Tragulina*, *Tylopoda*, and *Suina*.

6. The outer metacarpal and metatarsal bones are rudimentary, and do not extend the entire length of the middle metacarpal and metatarsals.

7. The distal extremity of the fibula is represented by a distinct malleolar bone of peculiar shape, articulating with the outer surface of the lower end of the tibia‡.

8. The molar and premolar teeth of *Moschus* are truly Cervine, though more compressed throughout the series than in most Deer. In consequence of this, the first upper premolar has the inner crescentic lobe but little developed; but its presence can be distinctly seen in specimens that are not much worn, and there is no tendency to that great disparity of breadth between the two anterior premolars and the true molars seen in the *Tragulina*, whose teeth retain much of the old *Xiphodon* type§.

It is scarcely necessary for the present purpose to enumerate numerous minor osteological characters (many of which are pointed

\* For a description of the placenta of *Moschus*, we are indebted to Pallas (*loc. cit.*).

† The only recorded exception to the ordinary origin of the left brachial artery in the *Pecora* is in the Giraffe, where Prof. Owen found that the arch of the aorta, after distributing the vessels to the heart itself, gives off first a large innominate, which subdivides into the right vertebral artery, the right brachial artery, and the common trunk of the two carotids, secondly the left brachial artery, thirdly the left vertebral artery (*Trans. Zool. Soc.* vol. ii. p. 229). But Joly and Lavocat describe, in the Giraffe dissected by them, a common innominate trunk (or anterior aorta) as in the Ruminants generally, giving off both brachials and carotids ("Recherches sur la Giraffe," *Mém. Soc. d'Hist. Nat. de Strasbourg*, t. iii. 1845, p. 103); and Prof. A. H. Garrod informs me that the same distribution of the great vessels occurred in two specimens which he had examined.

‡ In *Tragulus* the upper part of the fibula is present as a long slender style, but the lower end ankyloses at an early age with the tibia. The latter is the case with *Hyomoschus crassus* and *H. aquaticus*, according to A. Milne-Edwards; but in a perfectly adult specimen of the last-named animal in the Museum of the Royal College of Surgeons, the malleolar bone is still free, though not of the very characteristic form it possesses in all true Ruminants.

§ In all Deer the first upper premolar has three roots, and the crown is formed by an inner and outer crescent. In *Tragulus* this tooth has but two roots, and a simple compressed crown. In *Hyomoschus*, though the crown resembles that of *Tragulus*, the additional inner root is present. In this respect, as in the condition of the fibula, *Hyomoschus* comes nearer to the Deer than does *Tragulus*.

out in Milne-Edwards's monograph) by which the *Tragulina* differ from the *Pecora*, including *Moschus*; but perhaps the absence of a distinct ridge on the lower end of the metapodium and the form of the lower jaw may be mentioned as examples—the coronoid process being much less elevated, not rising prominently above the zygoma, and the posterior and inferior surfaces presenting an even curve, without a distinct projection at the angle. It may, in fact, be taken for granted that, when animals of the same original type have been so far modified as to differ in so many important characters as have been shown above, the closer the scrutiny of their structure, the more differences in details will be revealed\*.

The question of the near affinity of *Moschus* to the *Tragulina* being thus eliminated, I will next proceed to consider its position in the group of which it is really a member.

The *Pecora* or true Ruminants form, as has often been remarked, an extremely homogeneous group, one of the best-defined and closely united of any of the Mammalia. But though the original or common type has never been departed from in essentials, variation has been very active among them within certain limits; and the great difficulty of subdividing them into natural groups (the "despair of zoologists," as Pucheran calls it) arises from the fact that the changes in different organs (feet, skull, frontal appendages, teeth, cutaneous glands, &c.) have proceeded with such apparent irregularity and absence of correlation that the different modifications of these parts are most variously combined in different members of the group. In questions of this kind the absolute certainty of zoological classification referred to above no longer holds, at least in the present state of knowledge, and opinion may be allowed to have sway, and results must be stated with some feeling of doubt and diffidence. It appears, however, extremely probable that the *Pecora* very soon branched into two main types, the *Cervidæ* and the *Bovidæ* (otherwise the antlered and the horned Ruminants), the Giraffe being perhaps an early and since much modified offset of the former—though whether this be the case or whether it be regarded as a third distinct type may be left out of present consideration.

Although by the general consent of all naturalists the two main groups thus indicated are held to be distinct, and although there is no difficulty in separating them by the character of their frontal appendages, it is by no means easy to find further characters universally applicable by which they can be distinguished, and which are necessary in the cases in which such appendages are not developed, as in the animal now under discussion.

It may be said generally that the *Bovidæ* are distinguished from

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while in the form and greater freedom of the inner metacarpal and metatarsal bones it is further removed from them. In both genera the true molars are much less deeply indented by the enamel inflections, and the characteristic "Ruminant" crescent less distinctly defined than in the Deer.

\* Dr. J. Chatin has recently described the muscles of the limbs of *Hyomoschus*, and finds, as might have been anticipated, that they differ much from those of the *Pecora* and rather resemble those of the *Suina* ("Observations sur la Myologie de l'*Hyomoschus*," Annales des Sciences Naturelles, 5<sup>e</sup> série, t. xv. 1872, p. 1).

the *Cervidæ* by the absence of canine teeth, by the absence of distinct metacarpals and phalanges to the outer (second and fifth) digits, by the presence of a gall-bladder, by the single lachrymal canal placed within the margin of the orbit, and by the presence of Cowper's glands. But yet, as will be shown presently, it is doubtful if any one of these characters is exclusively characteristic—that is, may not be found in some member of the other groups.

There is still another character of some importance, derived from the form of the molar teeth. Although there is nothing in the general mode of arrangement of the enamel-folds or in the accessory columns absolutely distinctive between the two groups, existing species can generally be distinguished, inasmuch as the Deer are what may be termed “brachyodont,” and the *Bovidæ* “hypsodont”\*: *i. e.* the teeth of the former have comparatively short crowns, which, as in most mammals, take their place at once with the neck (or point where the crown and root join) on a level with or a little above the alveolar border, and remain in this position throughout the animal's life; whereas in the other form (the crown being lengthened and the root small) the neck does not come up to the alveolar level until a considerable part of the surface has worn away, and the crown of the tooth thus appears for the greater part of the animal's life partially buried in the socket, and no part of the root is visible. In this form of tooth (which is always most developed in the posterior molars of the permanent series) the constituent columns of the crown are necessarily nearly parallel, whereas in the other they diverge from the neck towards the free or grinding surface of the tooth. In the more completely hypsodont forms, the interstices of the lengthened columnar folds of enamel and dentine are filled up with cementum, which gives stability to the whole organ, and which is entirely or nearly wanting in the short crowned teeth.

The same modifications from low to high crowns without essential alteration of pattern is seen in an even still more marked manner in some of the Perissodactyle Ungulates, where the tooth of a horse bears to that of *Anchitherium* the same relation that that of an ox does to the early Selenodont Artiodactyles.

As the hypsodont tooth is essentially a modification of, and, as it were, an improvement upon, or specialization of, the other, it is but natural to expect that all intermediate forms may be met with; and it is not always easy to decide, especially in old and much-worn teeth, in which group any given example should be classed. Even among the Deer themselves, as Lartet has observed†, the most ancient have very short molars, and the depressions on the grinding-surface are so shallow that the bottom is always visible, while in the *Cervidæ* of the more recent Tertiary periods, and especially the Pleistocene and living species, these same cavities are so deep that, whatever be the state of the dentition, the bottom cannot be seen‡.

\* Terms first used, I believe, by Mr. Boyd Dawkins.

† Comptes Rendus, 1868, t. lvi. p. 1119.

‡ Some existing Deer, as the Axis, are far more hypsodont than the majority of the family; and, on the other hand, many of the Antelopes are far more brachyodont than the more typical *Bovidæ*—Goats, Sheep, and Oxen.



There is, however, little practical difficulty in deciding, by an examination of the molar teeth of any of the existing Ruminants, to which section it belongs; and, judged by this test, *Moschus* is decidedly brachyodont, and thereby resembles the Cervine members of the group, though in some details, as has already been mentioned, it has slight peculiarities of its own.

The best method, however, of testing the claims of *Moschus* to a definite position will be to take *seriatim* all the principal characters in which it shows variation from the average Pecorine type, and consider in which direction they severally tend.

I. The absence of frontal appendages. This is a well-marked external character, but one the significance of which has been much altered by Mr. Swinhoe's discovery of *Hydropotes*, which, although its anatomy is not yet fully known, I think may be safely assumed to be a true Deer. It is certainly less aberrant than *Moschus*\*.

Even before the existence of other Deer without antlers was known, it might have been suspected that such appendages were really only of secondary importance in a natural system of classification, as they occur among existing Deer in such infinite variety of form and size without correlation with other structural modifications; and as, moreover, palæontology teaches us that Deer (*i. e.* animals having all the osteological and dental characters of the group, as *Dremotherium*) abounded before the antlered forms came into being, it is by no means unreasonable to suppose that some of the recent members of the family might retain this primitive character†.

As one or more species of true Deer are without antlers in either sex, as all (*Tarandus* excepted) have none in the female sex, and as, on the other hand, no *Bovidæ* are known without frontal appendages in the male and nearly all have them in both sexes, it follows that a ruminant, like *Moschus*, wanting these parts is so far more likely to belong to the Cervine than to the Bovine section. The absence of antlers is no indication of special relationship to the *Tragulina* any more than it is to the Camels, Pigs, or any of the early forms of the order.

II. Dentition. The brachyodont character of the molar teeth, as lately mentioned, is some evidence in favour of *Moschus* belonging to the Cervine section, but not by itself conclusive; for even if we knew of no existing Bovine animal in this case, it would be quite possible to conceive of some member of the group retaining a character once common to all.

\* The still more recently discovered *Lophotragus nichianus*, Swinhoe (P. Z. S. 1874, p. 452), appears to be another Deer without antlers; but very little is yet known of its structure.

† *Dremotherium* is sometimes placed among the *Tragulidæ*, or rather the artificial group in which those animals as well as *Moschus* were included; but in the majority of its dental and cranial characters it was a true Deer, of course somewhat generalized and in so far approaching the *Tragulina*. *Elocus* was an older form, and retained the four premolars of the more primitive types. They both appear to belong to the stock from which the *Pecora* are descended after the ancestors of the *Tragulina* had branched off from it. The latter, as will be seen in the tabular view of the classification of the group (p. 189), are the lowest and least-modified of all the existing selenodont Artiodactyles.

The incisors are of rather peculiar form, the central being straight and awl-shaped instead of expanded and diverging, as not only in most Deer and Antelopes, but also, in a still more marked degree, in the *Tragulina*. But the Reindeer, as Sir Victor Brooke lately pointed out\*, has incisors not unlike those of the Musk; and the same or a closely similar form is not uncommon among the *Bovidæ*. This is rather an absence of specialization than a mark of affinity.

The great development of the upper canine teeth of the male is a remarkable characteristic of *Moschus*, and one on which much stress was formerly laid in separating it from the Deer. Most of the latter, however, have canines; and their great size in the Muntjaks forms a considerable approximation to the condition in *Moschus*. But *Hydropotes* offers a crucial test of the value of this character. This singular genus agrees with *Moschus* in the great size of the canines as well as the absence of antlers (in these cases apparently correlated phenomena). If *Moschus* is to be separated from the *Cervidæ* on the strength of these two most striking external characters, *Hydropotes* must go with it, and the family *Moschidæ* will consist of the two genera *Moschus* and *Hydropotes*†—an arrangement which may satisfy some zoologists; but, as shown by Sir Victor Brooke in his description of the skull of *Hydropotes*, these animals differ greatly in many important respects; in fact, in the form of the base of the cranium, they are as widely removed from each other as are any of the true Deer,—*Moschus*, with its small rugged auditory bulla, resembling the Muntjak and the Roe; while *Hydropotes* has the same part smooth and inflated even in a greater degree than the Axis and Hog-Deer, and more resembling some of the Antelopes. The question of the affinity of these two forms will receive further elucidation when the visceral anatomy of *Hydropotes* is known; but there is at present but little reason for supposing them nearly related.

As it is a very characteristic feature in the *Bovidæ* to have entirely lost the upper canine teeth (very few indeed possessing any, and these always very rudimentary), their presence on such a large scale in *Moschus* is further corroboration to the evidence derived from the molars that it is not intimately allied to that family.

On the other hand, little weight can be attached to this character as showing any very near affinity to the *Tragulina*. The excessive growth of a particular tooth is an instance of specialization, and occurs so often in forms so remotely allied to each other as *Machairodus*, *Trichechus*, &c., that it can only be taken as evidence of relationship between animals otherwise very nearly akin. In the present case it is probably adaptive, and follows the general tendency among all Artiodactyles, Suine as well as Ruminant, to possess either tusk-like canines or frontal appendages, these being, with some notable exceptions, complementary to each other in development. All the early Artiodactyles had canines, at first of moderate proportions; but it was not long before the tusks became immensely developed in the

\* "On *Hydropotes inermis* and its Cranial Characters as compared with those of *Moschus moschiferus*," P. Z. S. 1872, p. 522.

† As in Dr. Gray's 'Hand-list of Ruminants in the British Museum,' 1872.

males of many species, as *Amphitragulus* and *Dremotherium*. These, after a time, became generally superseded by horns or antlers; but they have either continued from those times or have been independently developed by the agency of similar causes in *Hydropotes* and in *Moschus*, and to a less extent in *Cervulus*, *Tragulus*, and *Hyomoschus*. The latter supposition seems more likely, as when closely examined the canines of *Moschus* and *Tragulus* will be seen to differ much in form and direction. The former are rounded and the latter concave on the external surface; the former tend to approach each other as they grow downwards, the latter to diverge and turn backwards\*. The canines of the Musk seem at first sight to differ from those of other Deer in having persistent pulps; but this is only a question of degree. In old Musks, as in old Muntjaks and *Hydropotes*, the base of the tooth becomes closed, as specimens in the Museum of the College of Surgeons show; but this takes place at a relatively later age.

III. The special characters of the feet are:—(1) the navicular and cuboid united together, (2) the ectocuneiform free, (3) the outer metatarsals entirely absent, (4) the lower extremity of the outer metacarpals fairly developed, (5) well-developed phalanges to the outer toes on all extremities.

The first is common to all the *Pecora* and *Tragulina*, but separates them from the *Tylopoda* and *Suina*. The second is found in all *Pecora* except the Muntjaks and the Pudu, which, in the union of these bones, exhibit a nearer approach to the Chevrotains than does *Moschus*. The third character is common to all the *Pecora*†, and separates them from the *Tragulina*. The fourth *Moschus* shares in common with *Alces*, *Rangifer*, *Hydropotes*, *Capreolus*, *Coassus*, *Cariacus*, and *Pudu*, but not with the other Deer or any of the remaining *Pecora*‡. The fifth is found in all the *Cervidæ* except *Cervulus*, but not (or only in a comparatively rudimentary condition) in any of the other *Pecora*.

The evidence from the feet, then, is decidedly in favour of the affinity of *Moschus* with the *Cervidæ*; for in that group alone is their exact counterpart to be found.

IV. A very constant distinction in the skeletons of the *Bovidæ* and the *Cervidæ* (excluding *Moschus*) is to be found in the orifice of the lachrymal canal. In nearly all the former this is single and situated just within the anterior margin of the orbit; in the latter there are two openings, one above the other (the upper one situated just upon, and the lower one rather anterior to, the margin of the orbit), and there is generally a bony tubercle between them; the two canals very soon join together. Professor A. Milne-Edwards, to whose excellent observations on this group of animals I am indebted for my first knowledge of this useful character§, mentions certain exceptions; but on a closer examination of these, I find

\* Milne-Edwards, *op. cit.* p. 50.

† If ever present, they are excessively rudimentary.

‡ See Sir Victor Brooke, P. Z. S. 1874, p. 36.

§ Though pointed out in Cuvier's 'Leçons d'Anatomie Comparée,' t. ii. (1837).

that his rule is even more absolute than he himself supposed it to be\*.

*Hydropotes* exactly follows the other Deer in this respect, while *Moschus* entirely differs from them and agrees with the *Bovidæ*. But it is not only the *Bovidæ* but also the *Tragulina*, the *Tylopoda*, and probably all the primitive Artiodactyles † that *Moschus* resembles in this character; wherefore it is only evidence of generalization or the retention of an original character, not of special affinity to either one of the other groups which possess it. It is a very singular circumstance, and not easily explained, that the conformation of the lachrymal canals, which has just been mentioned as a special character of the typical *Cervidæ*, also appears in the modern Pigs.

V. The presence of a gall-bladder. This, like the last, is obviously the retention of a general character, as the presence of this organ is the rule in all Artiodactyles excepting the Deer, the Giraffe (where it has occasionally been found), the Camels, and the Peccaries. More accurate and extended observations, however, are required as to its presence or absence; for, at least in those orders (as the Artiodactyles and the Rodents) in which it may or may not be present in nearly allied forms, it seems to be a somewhat variable character even in the same species‡.

The presence of a pedunculated Spigelian lobule to the liver must

\* Speaking of *Moschus*, Milne-Edwards says:—"Le trou lacrymal est unique, situé à la partie inférieure de l'os du même nom en dedans du bord orbitaire, disposition qui ne se voit qu'exceptionnellement chez les Cerfs, mais qui existe d'ordinaire dans le groupe des Antilopes," adding in a note "Chez le Cerf Duvaucel, on ne compte également qu'un seul trou lacrymal, mais chez presque toutes les autres espèces du même genre, il en existe deux, l'un au-dessus de l'autre sur le bord même de l'orbite ou plutôt en dehors. Chez le Muntjak, on trouve trois trous lacrymaux. Le Gnou et le Guib [as mentioned in the 'Leçons d'Anatomie Comparée,' 2nd edit. t. ii. p. 495] sont des exceptions à cette règle, leurs trous lacrymaux sont au nombre de deux de chaque côté." (*Op. cit.* p. 17.)

With reference to the first exception, in a series of skulls of *Cervus duvaucelli* in the British Museum I find the lachrymal canal double and conforming in every way to the ordinary Cervine type. In the Muntjak the third or lowest foramen on the anterior margin of the orbit is not an opening into the lachrymal canal but an antero-posterior perforation of the wall of the orbit, passing from the orbit into the antorbital fossa, and probably for the passage of a vessel or nerve. The true lachrymal orifices are like those of other Deer. In the Gnu the second or lower foramen, as the lowest in the Muntjak, has nothing to do with the lachrymal canal, but is only a perforation of the prominent anterior edge of the orbit, represented by a notch in many other allied forms. The Guib (*Tragelaphus scriptus*) and its immediate allies *T. decula* and *T. sylvaticus*, and the Eland (*Oreas canna*), however, are real exceptions; and there is another in the curiously aberrant Prongbuck (*Antilocapra*), which possesses the Cervine character of a double orifice to the lachrymal canal (though not placed quite so externally as in the Deer), in addition to others pointed out by Dr. Murie (P. Z. S. 1870, p. 334); yet this animal has most strongly marked hypsodont molars.

† This is certainly the case with *Canotherium*, *Xiphodon*, *Hypopotamus*, and all the Eocene Artiodactyles which I have examined.

‡ As is well known, Dr. Crisp (P. Z. S. 1862, p. 136) has recorded the presence of a gall-bladder in three specimens of the Axis and in one of the American Deer (*Cervus superciliaris*) and its absence in eight species of the *Bovidæ* examined by him.

also be noticed, and perhaps accounted for in the same manner; but until the livers of all other species of Deer have been examined, its significance cannot be properly estimated.

VI. In the same category may be placed the presence of Cowper's glands, organs generally absent in the Deer and present in all the other Artiodactyla. But although the examination into this question has not yet been very searching, exceptions have already been found. Their presence in the Pudu has been noted above; and their absence in the Prongbuck (*Antilocapra*), an animal which though aberrant I cannot but place among the Bovine section of the group, has been recorded by Dr. Murie in his valuable description of the anatomy of that animal\*.

Together with the absence of Cowper's glands, the Deer have a form of penis unknown in other Artiodactyles, and to which *Moschus* does not quite conform; but closer investigations are required before the value of this character can be ascertained.

VII. The cutaneous glands. Some importance as a taxonomic character has been attached by zoologists to the abdominal odoriferous gland for which the Musk-Deer is so well known. This has been given, for instance, as one of the family characters by which *Moschus* has been separated from the Deer on the one hand and the Chevrotains on the other. But its importance has been overrated, from the supposition that it was a structure *sui generis* instead of only one of the numerous modifications of specialized patches of involuted integument found so universally throughout the vertebrate animals, probably always for a similar purpose at present not perfectly understood, but evidently connected with the discovery and recognition of the presence of individuals of the same species in the neighbourhood. Such glandular patches, either of the skin extended in its usual manner over the surface, or more or less involuted so as to produce a pouch in which the secretion may be retained for a time and its effect thus intensified, are abundantly developed and most variously located in the Artiodactyla—as below the lower jaw in the Chevrotains, on the forehead in the Muntjaks, behind the ear in the Chamois, below the ear in the Prongbuck, in front of the eye (the crumen) in a vast number of species, on the middle of the back in the Peccaries, beneath the tail in Goats, within the edge of the prepuce in the Pigs, some Antelopes, and *Moschus*, in the inguinal region in many Antelopes, on the outside of the metatarsus in most Deer, between the toes in so many species; and their presence or absence, though extremely interesting to observe in each species, especially with a hope to discover more of their function, is not so constantly correlated with other characters as to enable us to make use of them in classification otherwise than in distinguishing very minor groups. There are, in fact, few parts of the organization so variable and readily modified†.

\* P. Z. S. 1870, p. 334.

† Although the first commencement of the modifications of portions of the external covering for the formation of special secretions may be at present difficult to understand, the principal of natural selection will readily

The absence of antorbital glands (generally indicated in the skeleton by the flatness of the facial surface of the lachrymal bone) is a general character of the older members of the order, retained in some few Deer, many of the *Bovidae*, the Giraffe, and all *Tragulina*, *Tylopoda*, and *Suina*. The same is probably the case with the interdigital glands, while the great development of the preputial gland is a specialization of the genus *Moschus*.

VIII. The brain of the Musk, in its smallness, simplicity of surface-markings, and narrowness of the anterior part, indicates a low type of the group. It is inferior in these respects to the existing Deer, and still more to the Antelopes of corresponding size.

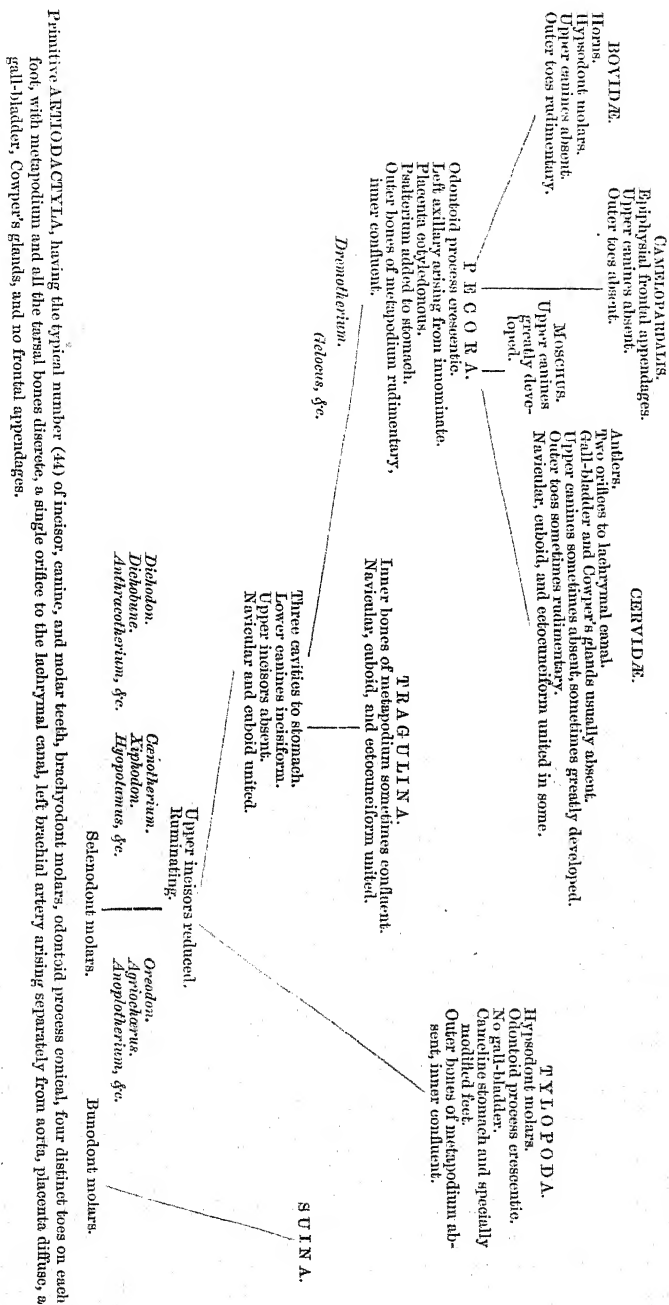
IX. The peculiar construction of the psalterium probably also indicates a simple or low type of the group.

X. I am not quite sure whether it is safe to put any reliance upon the character of the hair of the Musk, which is rather an exaggeration of that found in most Deer. But Antelopes such as *Antilocapra*, and especially *Oreotragus saltatrix*, show a very similar structure in their external covering. The fact of the young Musks being spotted (a character so nearly universal in the Deer, and not known in any of the other groups) may be some indication of Cervine affinity.

To sum up the position of *Moschus*, it appears to me to be an animal belonging to the stock which remained of the selenodont (or crescentic-toothed) Artiodactyles after the *Tylopoda* and the *Tragulina* had been thrown off, and which, by continued modifications of the placenta, of the stomach, and other parts, produced the *Pecora*. Of this stock it is a low and little-specialized form, not having the characteristic peculiarities of either the *Bovidae*, the *Giraffidae*, or the *Cervidae*, being probably descended from the stock before either of those forms was well established, and having undergone comparatively little modification, though on the whole its affinities are nearest to the last-named group. I look upon it as, in the totality of its organization, an undeveloped Deer—an animal which in most points has ceased to progress with the rest of the group, while in some few it has taken a special line of advance of its own. Its position will perhaps be better understood by reference to the annexed table, in which I have endeavoured to show, only of course in a provisional manner, the order in which the principal modifications of the primitive Artiodactyle type have been brought about. The names of some of the best-known extinct forms are inserted to indicate their position only approximately; in the absence of knowledge of their visceral anatomy and unfortunately of much of their osteology, greater certainty cannot be attained. The primary division of the order into Selenodonts, or those having a crescentic arrangement of the projections on their molar teeth, and Bunodonts, or those with only

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explain how such organs can become fixed and gradually increase in development in any species. If the function suggested above be the correct one, such individuals as by the intensity and peculiarity of their scent had greater power of attracting the opposite sex would certainly be those most likely to leave descendants to inherit and in their turn propagate the modification.



simple tubercles, which I believe is a perfectly natural one, was made by W. Kowalevsky; but the names were suggested to him by Prof. Owen, to whom this department of zoology owes so much. The modifications of the Buonodont forms, being beside the purpose of the present communication, have not been followed out.

Finally, it may be asked what place must be assigned to the Musk-Deer in our necessarily imperfect and artificial method of expressing the relationship of living beings? Should the genus *Moschus* be described as constituting a distinct family, *Moschidæ*? As I apprehend the value of the term "family," I think it should not. The characters which absolutely separate it from all the recognized *Cervidæ*, if *Hydropotes* is included among them, are very trifling; and to include *Hydropotes* with *Moschus* in one family, and leave all the other *Cervidæ* in another, appears to be a violation of natural affinities. It therefore appears most expedient to include them both as distinct generic modifications of the great family *Cervidæ*, recognizing of course that though a convenient it is not an absolutely perfect method of expressing their position in nature.

*Note to the tabular view of the Classification of Artiodactyla.*

The form of the odontoid process in the *Tylopoda* might lead to the idea that they were segregated from the Ruminant stock after the *Tragulina* had been given off; but as it is also found in the horse, it is probably adaptive, as are the hypsodont molars. The union of the inner, and loss of the outer, bones of the metapodium is also a character not significant of very close relationship to the *Pecora*, as the tendency to this modification begins in the earliest period of the history of the group with which we are acquainted, as in *Anoplotherium*, and crops out even in some of the buodonts, as the *Peccaries*.

2. On some new Species of *Erigone*.—Part I.  
By the Rev. O. P. CAMBRIDGE, M.A., C.M.Z.S.

[Received February 26, 1875.]

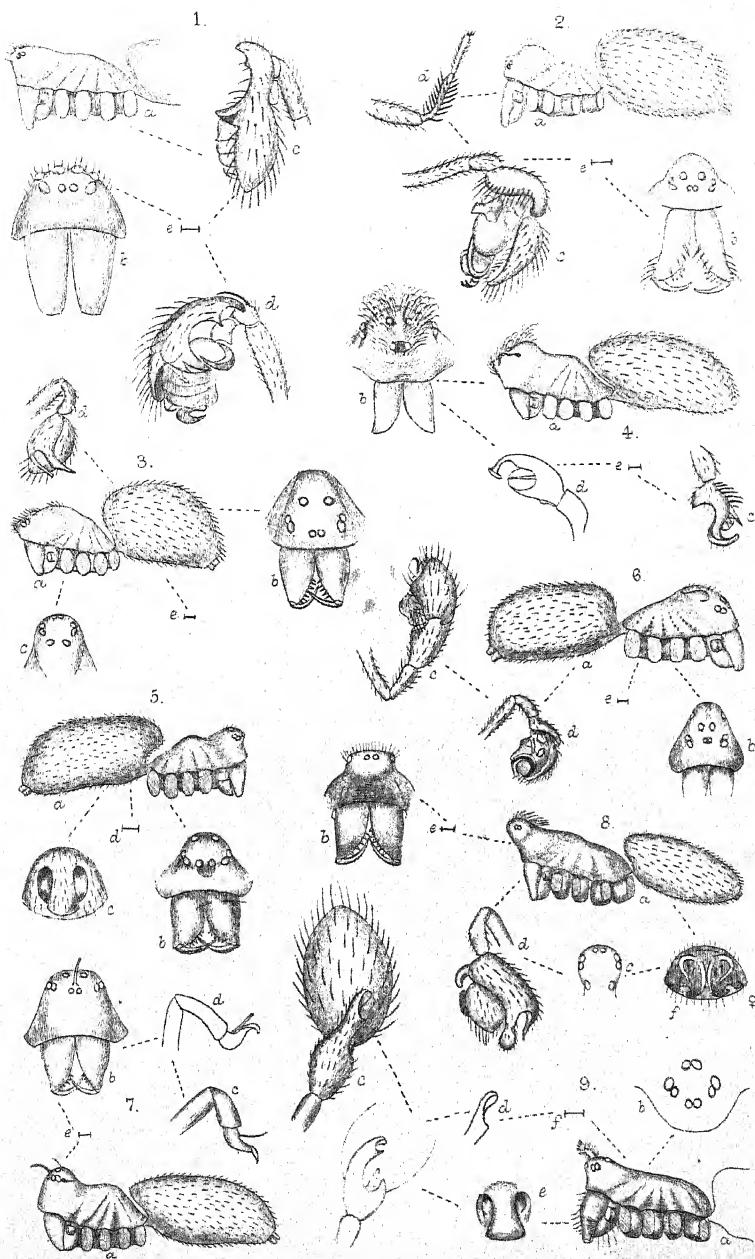
(Plates XXVII.-XXIX.)

The Spiders described in the following pages are, with one exception (*Erigone consimilis*, p. 192), a portion of a fine collection received at various times during the past three or four years from my kind friend, Monsieur Eugène Simon of Paris. The greater part are European, and were found by M. Simon himself in France, Corsica, Sicily, and Spain; several, however, are from Morocco and Algiers.

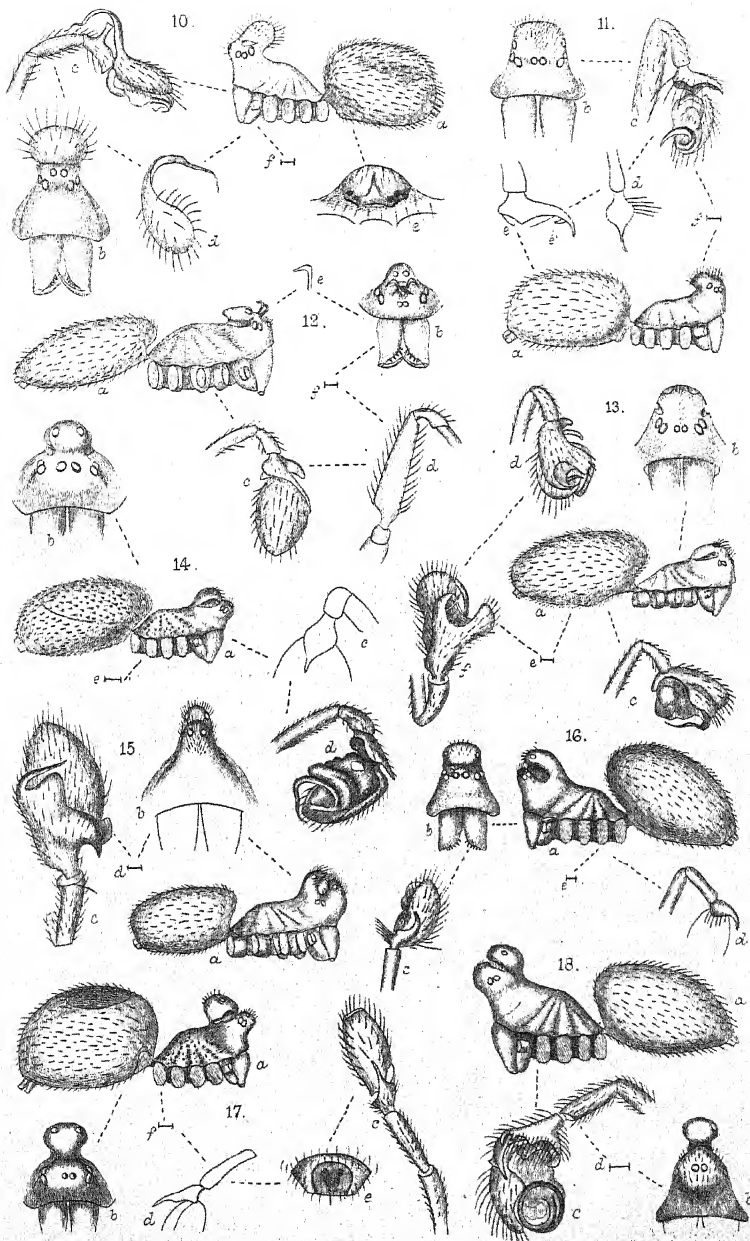
The twenty-four new species now selected for description from M. Simon's collection all (except one) belong to the group comprised in Mr. Blackwall's genus *Walckenaëra*; in addition to these, nine others new to science (belonging to the genus *Neriene* of the same author) remain yet to be described, while the collection also contained examples of forty-four known species.

Rich as the genus *Erigone* is at present in species, it is probable







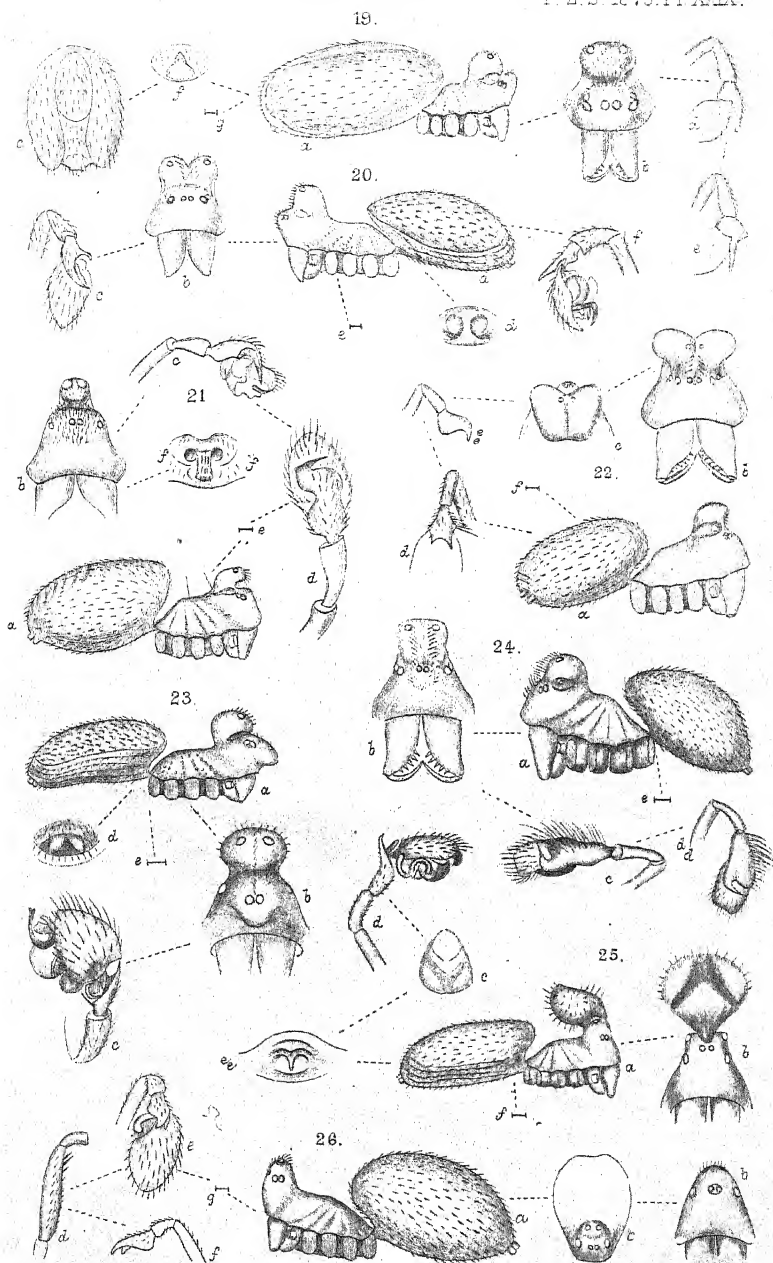


O. P. Cambridge del.  
A. T. Hollick sculp.

NEW SPECIES OF ERIGONE

W. Mearns C<sup>o</sup> imp.





O.P. Cambridge del.  
A.T. Hollick lith.

NEW SPECIES OF ERIGONE.



that very many more remain to be discovered; and the number of curious and distinct conformations of the caput in the male would seem to be almost without limit. It is probably from the several distinct types of this portion of the structure that it will be found some day most practicable to break up the genus into subordinate groups. While, however, the males may be thus grouped, it appears as yet that the females do not follow the same laws of development in respect of the caput, the structure of that part in the female affording frequently no evidence at all of affinity to the male; hence arises the great difficulty, in very many cases, of deciding to which species the females belong; for it often happens that any one of several females may, as far as structure and colour are concerned, be, with equal propriety, relegated to one male. It is not difficult to distinguish the different females among themselves, since each ordinarily possesses strong specific characters; but their general similarity of form makes it exceedingly difficult to propose any method of grouping them.

ERIGONE RETROVERSA, sp. n. (Plate XXVII. fig. 1.)

Adult male, length  $1\frac{1}{2}$  line.

The *cephalothorax* of this very distinct species is of a dull greenish olive colour and of a rather flattened form, the caput and thorax being nearly on the same level, and the normal grooves and indentations indistinct; the height of the clypeus is not quite two thirds of that of the facial space.

The *eyes* are of moderate size and not very unequal in their relative magnitude; they are seated on the fore part of the caput, which projects slightly forwards, in two transverse rows or four pairs somewhat closely grouped; those of the hinder row are about equidistant from each other, those of the fore central pair, which are the smallest of the eight, are rather nearer together than each is to the fore lateral eye on its side.

The *legs* are of a pale yellow colour, the tibiae of the first and second pairs being dark olive-brown; they are long and strong, furnished with hairs and a few nearly erect slender spine-like bristles.

The *palpi* are short: the cubital and radial joints very short, but of about equal length; the former is somewhat subangularly prominent on its upperside, where it has a strong, black, tapering bristle; a similar but longer and stronger bristle springs from the upperside of the radial joint, which enlarges at its extremity, but has no prominences or projections: the digital joint is of a dark yellowish brown colour, and has its hinder extremity produced into a long, very strong and slightly tapering projection, which curves back towards the cubital joint; the length of this produced part is equal to that of the joint, and its extremity is somewhat squarely truncated and of a blackish colour; near the extremity, on its outer edge, is a strong, black, sharp pointed corneous prominence; and below this again the digital joint has a large curvilinear prominent lobe; the palpal organs are well-developed, prominent, and complex.

The *falces* are long, strong, and a little inclined backwards; they are similar in colour to the cephalothorax.

The *maxillæ* and *labium* are normal and similar in colour to the *falces*.

The *sternum* is of the ordinary heart-shape, convex, glossy, and darker in colour than the *maxillæ*.

The *abdomen* is black, tinged with olive-green, glossy, hairy, and of an elongate-oval form.

An adult male of this Spider was received for examination in 1872 from M. Eugène Simon, by whom it was found near Paris. It is a most striking and remarkable species, allied to, but very distinct from, *Neriene cornigera* (Bl.).

ERIGONE CONSIMILIS, sp. n. (Plate XXVII. fig. 2.)

Adult male, length  $1\frac{1}{2}$  line.

This Spider is closely allied, both in general form, colour, and size, to *E. uncana* (Cambr.); but it may readily be distinguished, *first*, by the greater gibbosity of the occiput; *secondly*, by the length and divergence of the *falces*, which are also rather weak, and, besides the usual teeth on the inner side near their extremities, are furnished with several short, sharp, tooth-like spines towards their inner margin in front; *thirdly*, by the metatarsi of the first pair of legs being bent sharply downwards at their hinder extremity (the remainder being curved upwards), and, in addition to hairs, furnished with strongish spines chiefly on the fore half of their inner side; *fourthly*, by the radial joint of the palpus, while preserving the same general form, being stronger, *very obtuse* at its extremity, and of a deep shining chestnut-brown colour, approaching to black; the palpal organs also differ in structure.

The *cephalothorax* and other fore parts are of a dark yellow-brown colour, the legs being paler.

The *abdomen* is of a dull but glossy brown, tinged with yellow and thinly clothed with hairs, showing also in spirit of wine some metallic greenish reflections; on the hinder half of the upperside is a series of pale transverse curved lines which decrease in length towards the spinners.

A single example is in the British Museum collection; its locality is uncertain, but it is believed to be European.

ERIGONE LONGIUSCULA, sp. n. (Plate XXVII. fig. 3.)

Adult male, length  $\frac{3}{4}$  line.

The whole of the fore part of this Spider is of a bright orange-yellow colour, the palpi being rather paler and the abdomen jet-black. The *cephalothorax* is of the ordinary general form; the occiput is the most elevated part, whence it slopes to the clypeus, the caput being broad at its fore part but rather flattish, though with the sides tolerably well rounded. The ocular area is large and occupies the fore half of the upperside of the caput, and is furnished with short bristly hairs; the normal indentations are but faintly marked; at the hinder extremity of the occiput is a small dusky brown patch, from which several short indistinct lines of the same colour radiate. The whole surface of the *cephalothorax* is glossy.



The *eyes* are on black spots disposed in the usual four pairs, and forming an area rather broader than long; they are of moderate size and, relatively, do not differ to any very great extent; those of the hinder pair are separated from each other by rather less than two diameters; those of each lateral pair are contiguous to each other and are seated on a slight tubercle, the hind lateral eye being rather more than a diameter's distance from the eye nearest to it of the hinder pair; the fore laterals are the largest of the eight, and each is rather more than a diameter's distance from the eye nearest to it of the foremost pair; the eyes of this last pair are smallest of the eight, dark-coloured, but not quite contiguous to each other; the rest are pearly white.

The *legs* are moderate in length and strength; their relative length appeared to be 4, 1, 2, 3; there is, however, but little difference between those of the first and fourth pairs; they are furnished with hairs and a few erect and slender bristles on their uppersides.

The *palpi* are short but tolerably strong: the cubital joint is short, bent downwards, and slightly clavate at its fore extremity; the radial joint is short but is produced (on its whole width) at the upper extremity into a large and widening apophysis, which curves round in an inward direction and has its fore half bifid, the two limbs pointing outward; the inner limb is the slenderest, dark-coloured, blunt-pointed, curved, and somewhat cylindrical in form; the outer limb is stronger than the other, and goes off at its extremity into a fine and slightly curved point; this apophysis covers the greater part of the digital joint, which is small but of ordinary oval form: the palpal organs are prominent but not very complex; from their extremity, rather on the outer side, issues a long, dark brown, filiform, sharp-pointed spine, which bends round sharply upwards and backwards, continuing in that direction in a large but somewhat irregular coil, the point being directed inwards, near the extremity of the palpal organs and not far from the origin of the spine; another short, black, filiform spine runs close over the base of the palpal organs in a transverse direction, but it was difficult to see either its point of origin or its termination.

The *falces* are moderate in length and strength, rather directed backwards and armed with teeth towards their extremities on the inner side.

The *maxillæ*, *labium*, and *sternum* are normal in form, the last being slightly suffused with dusky brown.

The *abdomen* is short, oval, very convex above, and projects strongly over the base of the cephalothorax; it is jet-black in colour, glossy, and clothed very sparingly with short hairs.

An adult male of this very distinct species was received from M. Simon, by whom it was found in Corsica.

ERIGONE TRUNCATIFRONS, sp. n. (Plate XXVII. fig. 4.)

Adult male, length  $\frac{3}{4}$  line.

The whole of the fore part of this Spider is of a bright yellow colour, the upper part of the cephalothorax, as well as the femora and tibiæ of the legs, being tinged with orange. The caput is broad, a little

produced, of a somewhat truncate form at its upper extremity, not very dissimilar to that of *Erigone humilis* (Bl.); looked at in profile the occiput is a little roundly convex, with a hollow between its highest part and the thoracic junction. From the summit of the occipital convexity the caput slopes gradually to the fore central eyes, spreading out laterally on both sides into a strong tuberculiform elevation; at the summit of these elevations are the lateral pairs of eyes, from behind each of which a narrow indentation runs backwards. The whole of this fore slope of the caput (including the four pairs of eyes) is clothed pretty thickly with longish and, for the greater part, bent hairs, mostly diverging from the central longitudinal line and directed backwards; these hairs are very characteristic and give the Spider a very peculiar appearance.

The *eyes* are small, seated in four rather widely separated pairs on black spots, and form a rather narrow transverse area, whose width is no more than half its length; the lateral pairs, seated (as before mentioned) on two strong tuberculiform elevations, are nearly in a straight line with those of the hind central pair; those of this latter pair are rather smaller than those of the fore central pair, and are separated by an eye's diameter; these two pairs form an oblong rectangular figure, whose length is about double its breadth; and the interval between each eye of the hind central pair and the hind lateral eye nearest to it is equal to that between each of the former and the opposite fore central eye.

The *legs* are slender and moderately long, their relative length being apparently 4, 1, 2, 3; they are furnished with hairs and a slender spine-like bristle on the upperside of each of the femoral and tibial joints.

The *palpi* are short and furnished sparingly with hairs; the cubital joint is bent and rather longer, but less strong than the radial; this latter has its fore extremity produced into a long double twisted apophysis, its extreme point being rather obtuse and directed outwards; about halfway along the outer side of this apophysis is a rather small but prominent, pointed, dark-coloured spine, not far in front of which is another small pale prominence. This part of the radial joint is not easy to be made out clearly; the digital joint is of tolerable size; the palpal organs are highly developed and rather prominent, with one or two filiform black spines connected with them.

The *fulces* are small and directed backwards.

The *maxillæ*, *labium*, and *sternum* are of normal form.

The *abdomen* is of ordinary form and projects well over the base of the cephalothorax; it is of a dull blackish colour, suffused with yellowish on the fore part of the upperside, and its hinder portion marked with a series of 5 or 6 transverse curved yellowish lines, formed by tolerably distinct folds in the epidermis; the spinners are short, small, and of a pale yellow colour, and the spiracular plates are inclosed in a large, somewhat quadrangular, yellow area.

An adult male of this very distinct species was received from M. Eugène Simon, by whom it was found in Corsica.

ERIGONE HABILIS, sp. n. (Plate XXVII. fig. 5.)

Adult female, length  $1\frac{1}{3}$  line.

The *cephalothorax* of this fine species is of a deep rich chestnut-brown colour and very glossy; the caput is roundly convex above and slightly elevated; the thoracic junction is also rather elevated, so that between this point and the caput there is (when looked at in profile) a deepish hollow; the thoracic indentations are rather strongly marked, and the clypeus (the height of which is about half that of the facial space) projects a little forwards towards its lower margin.

The *eyes* are in four pairs, of tolerable size, and form a somewhat roundish oval figure; those of the hind central pair are separated by an interval equal to an eye's diameter, and each is separated by an equal space from the hind lateral eye on its side; those of each lateral pair are slightly obliquely placed, and are contiguous to each other; those of the fore central pair are the smallest of the eight, and situated rather beyond the straight line formed by the fore laterals. They are not quite contiguous to each other, but are separated by a small interval equal to that which divides each of them from the fore lateral eye nearest to it.

The *legs* are long and strong, particularly the femora and tibiæ of the first two pairs; and their relative length appeared to be 4, 1, 2, 3; their colour is yellow, except the femora, which are a bright rich orange-red, and the tibiæ of the first and second pairs, which are strongly suffused with brown; they are all well clothed with hairs, especially the tibiæ of the two pairs just mentioned.

The *palpi* are short, of a dark greenish yellow-brown colour, and furnished with hairs and longish bristles.

The *falces* are tolerably long and strong, slightly inclined backwards, a little prominent near their base in front, and similar in colour to the palpi; they are armed with sharp teeth towards the extremities on their inner sides.

The *maxillæ* and *labium* are of normal form; and their colour is similar to that of the falces, that of the sternum being like that of the cephalothorax.

The *abdomen* is oval, and projects well over the base of the cephalothorax; it is of a dull black colour, sparingly clothed with short hairs: the genital aperture is of simple but characteristic form.

A single example of this Spider was received in 1873 from M. Eugène Simon, by whom it was found at the Col de Natoire between Embrun and Barcelonnette.

Although it is possible that this may be the female of some male already described, I am inclined to think it is of a new species. It is allied to *E. unicornis*, Cambr., and to *E. clara* (id.); but the form of the cephalothorax is different and very characteristic, as also is the length, size, and colour of the legs, the brown tibial joints of those of the first and second pairs, with their more conspicuous clothing of hairs, making them very conspicuous.

It is impossible to conjecture what structure the male may possess; but it will be probably found to resemble the female in general colouring as well as in that of the tibiæ above mentioned.

*ERIGONE DORSUOSA*, sp. n. (Plate XXVII. fig. 6.)

Adult male, length  $\frac{3}{4}$  line.

The *cephalothorax* of this Spider is of a pale dull yellowish colour slightly tinged with green; it is short, rather flattish, and of a somewhat uniform convexity, the occiput, however, being rather gibbose, but not suddenly elevated; the summit of the gibbosity is furnished with a few very short hairs, and the profile line from the summit forms a slight but continuous curve; on each side of the summit is a large, longitudinal, strongly marked indentation or excavation; and the normal thoracic indentations appeared to be marked by converging lines of very small punctures.

The *eyes* are in two transverse lines or four pairs, as nearly as possible halfway between the lower fore margin of the caput and its summit; they are of ordinary size, those of the hind central pair are separated from each other by the distance of an eye's diameter, and are nearer together than each is to the the hind lateral on its side; those of the fore central pair are smallest of the eight, contiguous to each other, and each is separated from the hind central eye nearest to it by the diameter of the latter; those of each lateral pair are obliquely placed and contiguous to each other, each being separated from the fore central eye on its side by an interval rather greater than that which divides the latter from the hind central eye nearest to it.

The *legs* are short, slender, of a pale dull yellowish colour, furnished pretty thickly with hairs, and a few fine erect bristles on the upper sides; their relative length appeared to be 4, 1, 2, 3.

The *palpi* are short, of moderate strength, and similar to the legs in colour; the cubital joint is larger at its fore than at its hinder extremity; the radial is shorter and has its fore extremity expanded, with a prominent but short curved point about the middle and a short truncated projection on its outer side, on the margin near which is a row of strong bristly hairs; the digital joint is not very large, of an oval form, with a boldish prominence at the middle of its outer margin; the palpal organs are well developed and moderately complex, at their outer extremity is a black tapering spine coiled in a circular form, and its prominent point is very close to that of another fine black spine which springs from within the coil of the other.

The *falces* are of moderate length and strength, and project a little forwards; they are armed with a row of very minute teeth on their inner margin forwards, and, like the *maxillæ* and *labium*, are similar in colour to the cephalothorax.

The *sternum* is of a dull blackish colour mixed with pale yellowish, very convex and glossy, and marked thinly with minute punctures.

The *abdomen* is oval, but of a somewhat cylindrical form, and does not project over the base of the cephalothorax; it is of a dull blackish colour, and (in spirit of wine) thickly mottled with pale yellowish points and some transverse angular lines in a longitudinal series on the hinder half of the upperside; the colour of the spinners is similar to that of the legs.

An example of this minute Spider was sent to me in 1874 by M.

Eugène Simon, by whom it was found on the Glacier du Casset, in the French Alps. It is allied to *E. pallens* (Cambr.); but may be easily distinguished by the much stronger and broader indentations near the summit of the caput, and the far greater distance between the fore extremity of the indentations and the eyes of the lateral pairs.

ERIGONE ANTENNATA, sp. n. (Plate XXVII. fig. 7.)

Adult male, length  $\frac{3}{4}$  line.

The *cephalothorax* of this Spider is of a yellowish-brown colour, the legs, palpi, and falces rather paler, and the underparts suffused with black; the fore part of the caput is elevated, but not very strongly; the hinder part of the elevation slopes in a rounding form; and the point of junction of the thoracic segments is a little higher than the occipital depression; the clypeus rather exceeds in height two thirds of that of the facial space; and from near the centre of the ocular area (just above the fore central pair of eyes) springs a single strong, prominent, curved, setiform spine, whose point is directed rather abruptly downwards.

The *eyes* are in the usual four pairs, or two transverse curved lines, on the fore part of the elevation of the caput; the interval between each of the hind central eyes and the fore lateral on its side is equal to that between each and the fore central nearest to it, and, with these two, forms as nearly as possible an equilateral triangle; the interval between those of the hind central pair rather exceeds an eye's diameter, and is much less than that which separates each of them from the hind lateral on its side; the eyes of each of the lateral and fore central pairs respectively are contiguous to each other, those of the former being very obliquely placed.

The *legs* are rather long and slender; their relative length appeared to be 4, 1, 2, 3; and they are furnished with (apparently) short fine hairs only.

The *palpi* are rather strong and of moderate length: the cubital joint is much longer and stronger than the radial; it is bent, and its fore extremity is considerably stronger than its hinder one: the radial joint is small and very short, its fore extremity above and rather on the inner side is produced into an apophysis whose pointed extremity curves sharply round, pointing inwards and rather downwards; from the fore part, on the upperside of the radial joint, issues a curved setiform spine of about the same length, nearly as strong as that between the eyes; its point, however, is directed upwards: the digital joint is rather large, and, having a strong prominence both at its base and outer side, is of an irregular or somewhat roughly triangular form: the palpal organs are highly developed and very complex; among other strong prominent corneous processes there is, near their outer extremity, a long, exceedingly slender, black, filiform, prominent, circularly curved spine.

The *falces* are of moderate length and strength, rather directed backwards, and armed with a few sharp teeth on their inner sides towards the extremities.

The *abdomen* is of moderate size, not very convex above, but projects over the base of the cephalothorax; it is clothed very sparingly with short hairs, and is of a jet-black colour.

The curved spine on the forehead and those on the radial joints of the palpi are very characteristic, and will readily distinguish this Spider from all other known species of this group of the genus *Erigone*.

A single example was received from M. Eugène Simon, by whom it was found with others on the Col des Ayes, Casset, in the French alpine regions.

ERIGONE VAPORARIORUM, sp. n. (Plate XXVII. fig. 8.)

Adult male, length 1 line.

The colour of the cephalothorax, falces, maxillæ, labium, and sternum is a deep rich brown, the latter nearly black; that of the legs is reddish orange-yellow; the palpi are yellow tinged with brown; the radial and digital joints dark brown, and the abdomen black.

The *cephalothorax* is prominent in front, but not elevated, the fore part of the caput being broad, obtuse, and projecting forwards; there is a rather strong, but shallow, transverse impression immediately behind the ocular area, while the occiput is full and rounded; the surface is glossy, and the ocular area is furnished pretty thickly with hairs directed backwards; the clypeus retreats strongly, and its height equals half that of the facial space.

The *eyes* are in four pairs, and present a rather unusual figure, forming a rectangle on the flattish surface of the fore part of the caput; this figure is caused by the unusually wide separation of the eyes of the hinder pair, these, which are slightly the largest of the eight, being divided by an interval almost equal to that between the fore lateral eyes; those of the foremost pair are very small, dark-coloured, and inconspicuous, and near, but not contiguous to each other; those of each lateral pair are contiguous, and have the slightest possible oblique direction, each being almost in a line with the eye of the hinder pair on its side.

The *legs* are moderate in length and strength; their relative length is 4, 1, 2, 3; they are furnished with hairs and a very few slender prominent bristles.

The *palpi* are moderately long and strong: the cubital joint is rather clavate and bent downwards: the radial joint is short, but has its fore extremity on the upperside produced into a large apophysis, covering the greater part of the digital joint, and directed inwards; the extremity of this apophysis is bifid, the upper, or outer corner being produced into a strong, roundly clavate, prominent projection, curving outwards and upwards, while the inner, or lower, corner is produced into a curved, tapering, sharp-pointed one; this clavate projection makes the length of the radial apophysis almost equal to that of the digital joint; this joint is rather large, and of an oval form: the palpal organs are highly developed, prominent, and complex; among the corneous processes of which they

are composed is one at their base on the outer side, rather prominent and obtuse at its end; from near their extremity, on the same side, a strongish pale spine curves downwards and backwards, ending in a slender, curved, filiform point; and in front of this is another, shorter and stronger, and tapering to a point, but without a filiform ending.

The *falces* are moderately long and strong, and are straight, but inclined backwards towards the labium.

The *abdomen* is oval, moderately convex above, and projects a little over the base of the cephalothorax; it is glossy, black, and sparingly clothed with short hairs.

A single adult male of this very distinct *Erigone* was received from M. Simon, by whom it was found in France (Col de Natoia, between Embrun and Barcelonnette). It is allied to *Erigone* (*Walckenaëra*) *humilis* (Blackw.), *E. affinitata*, Cambr., and *E. crassiceps* (Westr.) = *E. bucula* (L. Koch). The last two species may be distinguished from *E. vaporariorum* by their more elevated caput; while *E. humilis* has a broader and more obtuse termination to the caput, and is without the transverse depression between the ocular area and the occiput, and the backward-directed hairs from this area, both of which are strongly characteristic of the present species.

ERIGONE CORNICULANS, sp. n. (Plate XXVII. fig. 9.)

Adult male, length  $1\frac{1}{3}$  line, rather more than  $2\frac{1}{2}$  millimetres.

The *cephalothorax* of this species, which is very nearly allied to *E. monoceros* (Wid.), is yellow, the caput, as well as the normal indentations, being slightly suffused with dusky brown; the fore part of the caput is slightly but gradually elevated, and a little prominent; and from the centre of the ocular area there rises a distinct horn-like eminence; this eminence is slightly curved, projects forwards, and is of a tapering form, blunt at the extremity, or of a somewhat subconical shape; its fore side and summit are furnished with some short, curved, clavate, prominent hairs, and some ordinary ones issue from its hinder part.

The *eyes* are of tolerable size, and seated in four pairs round the eminence on the fore part of the caput, those of each pair respectively being contiguous to each other. The four pairs describe very nearly a circle; but the interval between each lateral pair and the hinder pair is greater than that between the lateral and front pairs; the former interval is equal to the diameter of one of the hinder pair of eyes, the latter interval to the diameter of one of the front pair.

The *legs* are long and slender, their relative length being 4, 1, 2, 3; there appeared to be, however, but little difference between those of the first and second pairs; they are similar in colour to the cephalothorax, and are furnished with inconspicuous hairs and fine bristles.

The *palpi* are slender and of moderate length; their colour is pale yellow; the digital joint, however, is suffused with brown, and the radial joint is margined with black-brown on its inside: the cubital joint is clavate, or enlarges gradually from its hinder to its fore extremity: the radial joint is shorter, but stronger, than the cubital, and

spreading, and its upperside is produced into a strong, tapering, curved apophysis, the extremity of which is directed outwards over the base of the digital joint; the extremity of this apophysis is emarginate or circularly notched on its outer side, and at its base is a short, blackish, tapering, sharp-pointed, spine-like projection: the digital joint is large and of ordinary form: the palpal organs are well developed and rather complex, with a strongish, circularly curved, tapering, sharp-pointed spine at their fore extremity, on the outer side; and from near the base of this spine, and within its curvature, there issues another, short, nearly straight, and directed rather backwards.

The *falces* are moderately long and strong, prominent above the middle of their fore sides, divergent towards their extremities, where, on their inner edges, they are armed with a few small sharp teeth; they are of a yellow colour slightly suffused with brown, and have a few prominent bristly hairs on their fore sides. On the lower part of the outer side of each falx, and rather towards the hinder part, are a few transverse, slightly oblique, parallel, scratch-like marks.

The *maxillæ* and *labium* are of normal form, and of a dull yellowish colour.

The *sternum* is yellow, convex, glossy, and heart-shaped, and furnished with a few fine, prominent, dark, bristly hairs.

The *abdomen* is oval, moderately convex above, of a dull, somewhat greenish-brown hue, and sparingly clothed with fine hairs.

Although, for the most part, the above description might apply also to *Erigone monoceros* (Wid.), yet there will be no difficulty in distinguishing the two species by the greater size and height of the eminence on the ocular area of the present species, also by the larger size of the eyes and the contiguity of those of the hinder pair, the greater size (particularly in the width) of the ocular area in *E. monoceros*, and consequently the larger intervals between the different pairs of eyes. The radial apophysis also differs in the circular emargination at its extremity being quite on the outer side, and not (as in *E. monoceros*) very nearly at its extremity; and the spine-like projection on its outer side is shorter and less conspicuous. The circularly curved spine also, at the outer extremity of the palpal organs, in this latter species is shorter and proportionally stronger; and the extreme fore part of the caput is also broader and flatter, the spider itself, too, is smaller, and, in examples that have been some time adult, more richly and darkly coloured.

This species is also allied to *Erigone directa* (Cambr.) and *E. indirecta* (ej.) (North-American species); but it may be directly distinguished by the absence in these latter of clavate hairs on the horn-like eminence of the caput, the hairs in these species being of an ordinary nature.

The female, though a little larger, and devoid of the horn-like eminence on the caput, resembles the male in colours and general characters; the eyes however are more closely grouped, and there is a distinct interval between those of the hinder pair; the fore part also of the caput is less prominent. The form of the genital



aperture is characteristic, though somewhat resembling that of several others of this group, nearly allied to each other.

A single adult example of each sex was received in 1872 from M. Eugène Simon, by whom they were (with others of the same species) captured at Sappey, in France; an adult male of the same species, but darker and more richly coloured, had been previously received from M. Simon, from the neighbourhood of Paris, but was at the time mistaken for *E. monoceros*.

ERIGONE NIGROLIMBATA, sp. n. (Plate XXVIII. fig. 10.)

Adult male, length rather less than 1 line.

The whole of this exceedingly remarkable Spider is of a pale yellow colour, the cephalothorax and legs being rather the clearest and brightest, the former margined laterally with black. The caput is greatly elevated, the upper portion being roundish oviform and directed backwards; the part occupied by the fore central pair of eyes is prominent; and the height of the clypeus exceeds half that of the facial space; a strong longitudinal indentation or excavation on each side divides the upper part of the caput from the lower; the upper part is furnished with a few fine pale hairs.

The *eyes* are very unusually placed; those of the hind central pair, instead of being placed on or near the summit of the elevated oviform portion, are placed at its lower part, one on each side immediately above and behind the hind lateral eye, and almost contiguous with it; the eyes of each lateral pair, together with the hind central one on its side, form a short curved line on each side of the caput; those of the fore central pair are the highest up of all, instead of being, as in most other species, the lowest.

The *legs* are slender, moderate in length, their relative length (apparently) 4, 1, 2, 3; they are furnished with hairs and a few prominent black slender spines and bristles, those on the two hinder pairs being the most conspicuous; whereas in the adult female those on the two foremost pairs are strongest, particularly a row on the inner side of each of the tibial joints, which are long, strong, and very similar to those on the corresponding legs of *E. sundevallii* (Westr.).

The *palpi* are moderate in length and strength; the cubital joint is longer than the radial; the latter is prominently pointed beneath at its fore extremity, and has an almost perpendicularly erect apophysis springing from near the fore part of its upperside; this apophysis appeared to be nearly or about half the length of the joint, and is truncate at its extremity, which is rather broader than the middle portion: the digital joint is oval, produced at its hinder extremity into a long, strong, curved, corneous apophysis, terminating in a tapering, twisted, or sinuous, sharp, filiform spine, whose point is directed outwards: the palpal organs are highly developed and complex; among other corneous processes a somewhat sinuously curved, black, filiform spine is connected with them at their fore part on the underside.

The *falces* are small, nearly perpendicular, and armed with a few minute teeth near their inner extremities.

The *maxillæ*, *labium*, and *sternum* are of a normal character.

The *abdomen* is of a short oviform shape, very convex above, but not projecting at all over the base of the cephalothorax; it is thinly clothed with hairs, and of a pale, dull, straw-yellow colour, with a strong, rather irregularly defined, longitudinal, dark, sooty-brown band on each side of the upper part, but these do not meet either before or behind; a somewhat similar band runs along each side of the underpart of the abdomen; and the spinners have an indistinct circle of the same colour as the bands.

The adult female resembles the male in colours and general characters, but differs in the legs being armed (as mentioned above) with much stronger and more numerous spines, and in wanting the elevation on the caput; the genital aperture is of characteristic form (fig. 10, *e*).

This Spider combines several very remarkable characters, by which the male particularly may be distinguished from all other known species of this group possessing an elevated caput—that is, the peculiar position of the hind central eyes, the long, curved, horn-like projection at the hinder part of the digital joint of the palpi, and the dark longitudinal bands on the abdomen.

An adult example of each sex was sent to me by M. Eugène Simon, by whom they were, with others, found in old faggots of pine wood at Gyé sur Seine (Département de l'Aube).

ERIGONE LEPRIEURI, sp. n. (Plate XXVIII. fig. 11.)

Adult male, length rather over 1 line.

The *cephalothorax* of this Spider is of a brightish yellow-brown colour, indistinctly but rather broadly margined on the sides with dusky brown: the caput is elevated; and its upper part overhangs the occiput, and slopes a little forwards in front; the height of the clypeus (which is nearly perpendicular) is about two thirds of that of the facial space.

The *eyes* are in the usual general position; but the wide separation of those of the hind central pair causes them to form three groups—a lateral one, on each side, of three, and a central one of two eyes; those of the ordinary hind central pair are seated, one near the middle of each side of the summit of the elevation of the caput, and the interval which separates them is very nearly equal to that between the two fore lateral eyes; each of them is also rather less than an eye's diameter distant from the hind lateral on its side.

The *legs* are moderate in length and strength, their relative length being 4, 1, 2, 3; they are of a bright orange-yellow colour, and furnished with hairs and a very few prominent bristles on their upper-sides.

The *palpi* are strong, of tolerable length, and rather paler and duller-coloured than the legs: the cubital joint is rather long (half the length of the femoral joint), bent, and enlarged gradually to its fore extremity: the radial joint is short, spreading, and its fore extremity on the upperside is produced into a tolerably long, not very strong, but rather curved apophysis, having near its ex-

tremity on the underside a small, sharp, black, tooth-like spine, directed rather backwards; from the outer side of this joint there arise several strong bristles, besides others less strong: the digital joint is not very large, it is of a short oval form, and has a strongish prominence past the middle of the outer side: the palpal organs are prominent but not very complex; at their extremity on the outer side is a very strong, tapering, sharp-pointed, strongly curved spine or, rather, spiny process.

The *falces* are small, vertical, armed with a few very minute teeth on their inner sides near the extremity, and similar to the cephalothorax in colour.

The *maxillæ* and *labium* are of normal form, and similar in colour to the *falces*.

The *sternum* is of a deep brown colour.

The *abdomen* is oval, tolerably convex above, jet black in colour, glossy, and sparingly clothed with hairs.

An adult male of this very distinct species was received in 1874 from M. E. Simon, by whom it was found in Algeria.

ERIGONE STYLIFRONS, sp. n. (Plate XXVIII. fig. 12.)

Adult male, length not quite 1 line.

The whole of the fore part of this Spider is bright yellow, the cephalothorax being strongly tinged with reddish orange, and the femora and tibiæ of the legs with orange: the caput is more or less suffused with black-brown; towards its fore part is a not very large oval eminence, the hinder portion of which is obtusely pointed and directed backwards on each side; dividing it from the lower segment of the caput is a strong longitudinal indentation, extending from each hind lateral eye to the hinder part of the eminence; in front of this eminence is another small one, from which two sharply curved or bent, styliform, prominent and divergent projections issue, these projections are of a pale yellowish colour, diaphanous, and their sharp-pointed extremities are directed backwards and outwards; between them and the fore central pair of eyes are some short prominent black bristly hairs.

The *eyes* are small, not greatly differing in size, and are placed in the usual four pairs on black spots; those of the hinder pair are separated from each other by a diameter's distance, in a transverse line near the upper fore margin of the eminence on the caput; those of each lateral pair are contiguous to each other, and placed on a slight tubercular eminence; those of the fore central pair are smallest of the eight, dark-coloured, almost contiguous, and placed a little in advance of the straight line formed by the two fore lateral eyes. The extreme length and breadth of the ocular area are about equal; if any thing, the breadth is rather the greatest.

The *legs* are tolerably long and slender, except the femora of the first and second pairs, which are stronger than usual, principally towards their base on the upperside; their relative length is 1, 4, 2, 3; and they are furnished with hairs only.

The *palpi* are slender and moderately long, the cubital joint is

longer than the radial, slightly clavate, and bent downwards; the radial is very short, produced behind into a strong obtuse apophysis, and in front into a long, tapering, rather curved, pointed one, which fits rather closely upon the external surface of the digital joint and is directed outwards; the digital joint is of moderate size; and the palpal organs are neither very prominent nor complex; at their extremity is a very slender filiform, sharp-pointed, circularly curved, closely-fitting spine.

The *falces* are of moderate length; but not very strong; they are very nearly vertical, and armed on their inner edges towards the extremity with minute denticulations.

The *maxillæ* and *labium* are of normal form.

The *sternum* is of the ordinary heart-shape, and very convex and glossy.

The *abdomen* is oval, moderately convex above, of a jet-black colour, thinly clothed with hairs, and projects, but not very strongly, over the base of the cephalothorax.

An adult male of this Spider, which is nearly allied to *Erigone antica* (Wid.) and *E. flavida* (Menge), was received from M. Simon, by whom it was found in Corsica.

ERIGONE EBORODUNENSIS, sp. n. (Plate XXVIII. fig. 13.)

Adult male, length barely 1 line.

The cephalothorax, falces, maxillæ, and labium of this Spider are yellow-brown, the legs and palpi dull yellow, the digital joints of the latter strongly tinged with brown, the sternum and abdomen dull brownish black.

The fore part of the *cephalothorax* is bluff and obtuse, the caput being slightly elevated, the summit rounded, the occipital slope tolerably abrupt; the ocular area slopes forwards, and its profile, with that of the clypeus (whose height equals not quite half that of the facial space), forms an almost evenly curved line; from a little above and behind each hind lateral eye a deep tapering indentation runs backward in a horizontally longitudinal line to the lower part of the occiput; the other, normal, indentations are fairly but not very strongly marked; the ocular area has a few short hairs in a longitudinal central line; some of these are directed downwards, and some upwards.

The *eyes* are in the usual four pairs and seated on black spots; those of one pair, situated on the fore part of the summit of the caput, just at the beginning of its front slope, are separated by nearly two diameters; the two lateral pairs are placed at a considerable distance below; those of each of these pairs, respectively, are contiguous to each other and placed slightly obliquely, and with the eyes of the upper pair they form a quadrangular figure, three sides of which are about equal in length, while the fourth (*i. e.* the upper) side is considerably less; the eyes of the fore central pair are the smallest of the eight, dark-coloured and obscure, contiguous to each other, and placed in a straight line with the two fore lateral eyes; except the fore central pair, the eyes are shining pearly white.

The *legs* are slender, moderately long, furnished with hairs, and a very few slender prominent bristles on their uppersides.

The *palpi* have the humeral joint moderately long and slender: the cubital joint is clavate, slightly bent downwards, and about half the length of the humeral joint: the radial joint is short, spreading, prominent behind, and produced at its fore extremity on the upper-side into a very large apophysis, covering the greater portion of the digital joint; this apophysis is considerably the broadest at its fore extremity, where it is strongly emarginate or bifid, the outer limb of the bifid part being the longest, prominent, and obtuse, and broadest at its extremity; the inner one has a curved point directed rather downwards, and just within this curved point is a small, slightly-curved, sharp-pointed spine: the digital joint is of moderate size and of a somewhat oblong form: the palpal organs are well developed and complex; from their fore extremity a strong, black, tapering, sharp-pointed spine curves round outwards and backwards in a somewhat sinuously circular form.

The *falces* are neither very long nor strong; they are obliquely cut away on their inner sides towards the extremities, armed with minute teeth, and directed strongly backwards towards the maxillæ.

The *maxillæ*, *labium*, and *sternum* are normal in form and structure.

The *abdomen* is large, of an oval form, tolerably convex above, and projects over the base of the cephalothorax; it is of a dull brownish black colour, and sparingly clothed with short hairs.

A single example of the adult male of this species was sent me by M. Eugène Simon from the Col de Natoia in France; it is very similar to some others in the form of the cephalothorax; but the structure of the palpi will serve to distinguish it at once.

ERIGONE COCCINEA, sp. n. (Plate XXVIII. fig. 14.)

Adult male, length nearly  $1\frac{1}{2}$  line.

The cephalothorax, falces, maxillæ, labium, and sternum, as well as the upper part of the abdomen, of this Spider are of a bright orange-red colour, that of the legs and palpi being bright orange-yellow.

The *cephalothorax* has the hinder, or thoracic, portion marked with strong circular punctures, disposed in converging lines, following mainly the course of the normal indentations: the caput has an oval, tolerably strong eminence near the occiput; the fore extremity of the caput is also prominent, thus dividing the caput into two tolerably distinct lobes, of which the foremost or lower one is the strongest; the upper lobe is divided laterally from the lower one by a large excavation running backwards from its broadest and deepest part, above and behind each lateral pair of eyes, to the hinder part of the upper lobe (or eminence); the front slope of this eminence is steep though rounded; but the hinder one is much more gradual: the height of the clypeus is about half that of the facial space, its upper part is rounded and prominent, the lower part impressed and retreating; on the fore slope of the cephalic eminence are a few bristly black hairs directed forwards and downwards, meeting a few

others directed contrarily from the upper part of the lower segment of the caput.

The *eyes* are of tolerable size, and do not differ greatly in this respect; they are placed in the usual four pairs on small black spots; those of one pair, on the upperside of the fore part of the cephalic eminence, are separated from each other by an interval of about two diameters' extent; another pair is seated on each side of the upper part of the lower segment; the eyes of each of these lateral pairs are contiguous to each other, the eyes of the fourth, or fore central, pair are not quite contiguous to each other, being separated by nearly half a diameter; they are of an oval shape and rather obliquely opposed to each other, and, though rather darker than the rest (which are pearly white), are lighter-coloured and larger than usual, being equal in size to those on the cephalic eminence; the width of the ocular area at its widest or lower part a little exceeds, transversely, the length of its longitudinal diameter; the eyes of the fore central pair are placed a little above the line of the fore laterals, and each of these is separated from the fore central nearest to it by the diameter of one of the former.

The *legs* are moderate in length and strength; their relative length appeared to be 4, 1, 2, 3; they are furnished, but not very conspicuously, with short hairs.

The *palpi* are short; the cubital joint is slightly clavate at its fore extremity, and a little bent downwards; the radial joint is shorter than the cubital, and rather spreading above at its fore part, whence it is produced into a not very long, but rapidly tapering, pointed apophysis, the point being very slightly curved and rather pointed outwards; the digital joint is of tolerable size and ordinary form: the palpal organs are prominent, well developed, but not very complex; near their centre is a strong, transverse-oval, pale yellowish, corneous, convex lobe; and immediately in front of or below this is a strong, somewhat sinuously and circularly curved, sharp-pointed, black-brown spine.

The *falces* are neither very long nor strong; they are directed a little backwards, and have a few minute teeth on their inner edge towards the extremities.

The *maxillæ* and *labium* are of normal form; and the *sternum* is slightly marked with punctures.

The *abdomen* is rather large, and of a broad-oval form, tolerably convex above; the upper part is covered with a very distinct, coriaceous, thickly and strongly punctured epidermis of a rich orange-red colour, the sides and lower part being of a pale straw-yellow colour, spotted with minute orange-brown points or punctures; it is thinly clothed with short hairs; the spiracular plates and space between them, as well as a small oval portion in front of the spinners, are also of an orange-brown colour.

An adult male of this brightly coloured Spider, which is allied to *E. bucephala* (p. 217), was received from M. Simon, by whom it was found in Morocco. In the form of the cephalothorax it bears some resemblance to many other species; but its colour, combined with the

punctured surface of the abdomen, thorax, and sternum, and the structure of the palpi and palpal organs, will serve to distinguish it readily from other European species possessing a somewhat similarly formed caput.

ERIGONE FORAMINIFERA, sp. n. (Plate XXVIII. fig. 15.)

Adult male, length 1 line.

The *cephalothorax* is glossy and of a deep blackish-brown colour; the normal indentations are tolerably strong, and the surface near the margins is somewhat rugulose: the caput has the fore part, which is rather lighter-coloured, elevated and prominent; it is divided into two nearly equal lobes by a deep transverse cleft; the upper fore margin of the hinder lobe and the hinder margin of the front lobe approach each other pretty closely, but do not meet; the front lobe is rather the strongest, but of less height than the hinder one, the deepest point of the cleft is on a level with the profile line of the hinder part of the caput; the summit of each lobe is furnished pretty thickly with hairs, some of which meet over the cleft.

The *eyes* are in the usual four pairs; one pair is seated near the summit of the hinder lobe of the caput, an eye being on either side of it, another pair on the fore part near the summit of the front lobe, separated from each other by rather more than an eye's diameter, and a pair on either side a little below the base of the cleft: the eyes of each of these last two pairs are contiguous to each other; those of the front lobe are dark-coloured, indistinct, and the smallest of the eight; the rest are conspicuous, of a shining pearl-white, and do not differ much in size; the height of the clypeus considerably exceeds half that of the facial space.

The *legs* are slender, of moderate length, their relative length being 4, 1, 2, 3; they are of a dark orange-yellow colour, slightly tinged with brown, furnished with hairs, and a single, spine-like, prominent bristle on the upperside of each of the genual and tibial joints of the third and fourth pairs; there are several other bristles on the corresponding joints of the first and second pairs, but these are slenderer and less conspicuous.

The *palpi* are moderate in length and strength, of a yellow-brown colour, the radial and digital joints dark brown and furnished with hairs: the cubital joint is rather clavate, bent downwards, and much longer than the radial, which last, however, has the appearance of greater length from being produced at its fore extremity, on the upperside, into a long and broad apophysis, covering a large portion of the digital joint; this apophysis is of a somewhat oblong form, with a sharp-pointed tapering spine at its fore extremity on the inner side, bent sharply round and running across near its fore margin, which it rather exceeds in length, and a strong, rather bent, pointed prominence at its base on the outer side; it is also rather produced behind: the cubital joint has a single, prominent, spine-like bristle at its fore margin on the upperside; the digital joint is large and of ordinary form; the palpal organs are prominent and complex, with corneous processes and spines, and a prominent, tapering, pointed, slightly

curved, pale-coloured spine projects, with rather an outward direction, from their fore extremity.

The *falces* are moderately long and strong, and rather obliquely cut away towards their inner extremities, where they are armed with small sharp teeth; they are similar in colour to the fore part of the caput.

The *maxillæ* and *labium* are of the usual form, and of a deep brown colour.

The *sternum* is of ordinary shape, of a deep brown-black colour, glossy, furnished with a few fine bristly hairs, and, under a lens, apparently marked with a few fine punctures.

The *abdomen* is oval, tolerably convex above, and projects over the base of the cephalothorax; its colour is a glossy black, clothed sparingly with hairs.

This Spider, of which two examples were sent to me by M. Eugène Simon, from France (Col de Natoia), is allied to *E. alpina* (Cambr.) and *E. cucullata*, Koch; but it may easily be distinguished by the larger proportional size of the front lobe of the caput, which in those two species is smaller than the hinder lobe; it is also allied to *E. cristata* (Bl.); but the very different form of the caput and its cleft, as well as its larger size and shorter form, will distinguish it at once both from that and its near ally *E. permixta* (Cambr.). In the form of the caput and the cleft which divides it into two lobes, *E. foraminifera* bears a strong resemblance to *E. fissiceps* (Cambr.), a North-American Spider; but the smaller size of the latter, its different colours, and the coriaceous punctured epidermis of the upperside of the abdomen, as well as the strikingly different form of the palpi, will distinguish it at a glance.

ERIGONE LUCASI, sp. n. (Plate XXVIII. fig. 16.)

Adult male, length  $\frac{2}{3}$  of a line.

The *cephalothorax* is of a dark blackish-brown colour, the thoracic indentations indicated by black lines; the greater part of the caput is strongly elevated, the elevation projecting rather forwards, and separated from the fore part of the caput proper by a strong transverse indentation; the occipital region of the elevation forms a sloping curved profile-line; a large deep longitudinal indentation or excavation divides the elevation from the caput on either side; the fore part of the elevation is clothed with a few short hairs, mostly directed downwards, and meeting others directed upwards from the fore part of the caput; the height of the clypeus considerably exceeds half that of the facial space.

The *eyes* are in the usual four pairs; those of the upper (or hind lateral) pair are placed one on each side of the fore part of the summit of the elevation, and form a line only a very little, if any, shorter than that formed by the two fore lateral eyes; those of each lateral pair are placed on the sides of the fore part of the caput proper (or lower segment of the caput); and those of the fore central pair are on a strongish tubercular prominence, very indistinct, though not very minute, and not quite contiguous to each other.



The *legs* are rather short and not very strong; they are of a bright orange-yellow colour, furnished with hairs, and their relative length is 4, 1, 2, 3.

The *palpi* are of moderate length and strength, and of a dull yellow colour; the cubital joint is rather long, and nearly cylindrical in form; the radial is very short, and its fore extremity on the upperside is produced into a not very long, curved, tapering, and not very sharp-pointed apophysis directed strongly inwards; on the outer margin of the radial joint is a group of prominent bristly hairs; the digital joint is small; and the palpal organs are rather prominent, but not very complex or presenting any very marked feature.

The *falces* are small, nearly vertical, similar to the palpi in colour, and armed with a few very minute teeth on their inner sides towards the extremity.

The *maxillæ* and *labium* are normal in form, and rather darker in colour than the falces.

The *sternum* is tolerably convex, glossy, and of a deep black-brown colour.

The *abdomen* is of a short oval form, and considerably convex above; it projects a good deal over the base of the cephalothorax, and is of a glossy jet-black colour, clothed sparingly with short hairs.

An adult male of this Spider was forwarded to me in 1874 by M. Simon, by whom it was found at Algiers. By its specific name it is dedicated to Mons. H. Lucas (Curator of the Jardin des Plantes, Paris), whose voluminous work on the articulate animals of Algiers is too well-known to need more than a passing reference.

ERIGONE INEDITA, sp. n. (Plate XXVIII. fig. 17.)

Adult male, length nearly 1 line.

The *cephalothorax* is small, of a dull darkish yellow-brown colour, the converging indentations of the thorax indicated by rows of not very distinct pock-like marks or punctures; the fore part of the caput is rather prominent, and on the hinder part, at the occiput, is a strong, somewhat globular eminence, strongly constricted or excavated at the sides where it joins the caput; the hinder part of the eminence is well rounded; the fore part, looked at in profile, slopes rather downwards, and there is a deepish transverse indentation between it and the ordinary prominence of the caput, thus forming two distinct segments, of which the hinder one is the largest when seen in profile; the height of the clypeus is less than half that of the facial space; there are a few short prominent hairs on the cephalic eminence, and a few on the lower segment.

The *eyes* are in the usual four pairs; those of the upper pair are in a transverse line, nearly two diameters from each other, on the upper part of the cephalic eminence near the summit at the beginning of the front slope; those of each lateral pair are at the upper part on either side of the lower segment of the caput, close in front of the fore extremity of the lateral excavation, and they are contiguous to each other; those of the fore central pair are the smallest

of the eight, dark-coloured, indistinct, and seated contiguously (or nearly so) to each other at the extremity of the lower segment of the caput; the longitudinal diameter of the ocular area is greater than its transverse one.

The *legs* are moderately long, slender; and their relative length appeared to be 4, 1, 2, 3; they are furnished with inconspicuous hairs, and a very few slender erect bristles on their uppersides; the colour of the legs is yellow.

The *palpi* are rather long, slender, and their colour is similar to that of the legs; the cubital joint is long and slightly clavate: the radial joint is short, with its fore extremity, rather towards the outer side, produced into a fine, tapering, pointed, almost straight apophysis; the length of the joint with its apophysis is about half that of the cubital joint; the digital joint is rather small, and of ordinary form; the palpal organs are neither very prominent nor complex; in close contact with them, and at their extremity, is a small circularly curved sharp filiform spine.

The *falces*, *maxillæ*, and *labium* are rather lighter in colour than the cephalothorax, but present nothing unusual in form or structure.

The *sternum* is of ordinary form, and its colour is dark black-brown.

The *abdomen* is of a short oval form, very convex above, and of a pale, dull, straw-yellow colour, with a large dark-brown oval patch on the fore part of the upperside; and it is sparingly clothed with short inconspicuous hairs; the spinners are rather larger than usual, but perhaps they may have been accidentally protruded.

The adult *female* is rather larger than the male, but resembles it in colours and general characters; the caput, however, wants both the eminence and prominence of that sex, being merely of the ordinary form, with the occipital region slightly convex and rounded, and the clypeus prominent or, rather, projecting forwards. The genital aperture is somewhat horseshoe-shaped, and has within its opening some small processes, which, when looked at in profile, give it a rather prominent appearance.

An adult example of each sex was sent to me in July 1871, by M. Simon, by whom they were found in the neighbourhood of Paris; it is allied to *E. trifrons* (Cambr.); but the pale colour of the abdomen distinguishes it at a glance, besides the marked differences in the form of the caput and structure of the palpi.

#### ERIGONE CAPITO (Westr.). (Plate XXVIII. fig. 18.)

Adult male, length  $1\frac{1}{2}$  line.

The colour of the cephalothorax of this rare and remarkable Spider is a deep shining brown; the legs are orange-yellow, rather long, moderately strong, and furnished with hairs only; the palpi are similar in colour, except the digital joints, which are dark brown; and the abdomen is black.

The fore part of the caput has a strong elevation, and is divided into two segments—the lower one (comprising the fore part of the caput proper) prominent and rather produced forwards, the upper

one springing from the occiput ; the latter elevation is oval, rounded, and projecting forwards, lies nearly close upon the lower one ; between them, however, there is a perceptible division, so that the junctional portion, at the occiput, forms only a kind of neck ; the clypeus retreats, and is hollow in its profile-line. Two eyes are placed near the fore side of the summit of the upper segment of the caput, and six (in three pairs) on the fore part of the lower segment, in the ordinary position. The *palpi* are moderately long, and not very strong, except the digital joint, which is large ; the radial joint is shorter than the cubital, but strong and spreading at its fore extremity, the upper part of which, on the inner side, is produced into a long, strong, curved apophysis, whose extremity is of a somewhat bifid form and directed outwards ; on the outer edge of the apophysis are one or two sharpish prominent points ; the palpal organs are well developed and prominent, with a strong, sharp-pointed, black spine, coiled in a circular form, near their extremity on the outer side.

An adult male was received for examination, in April 1872, from M. Eugène Simon, by whom it was found near Paris.

Believing this Spider to be the *E. capito* of Westring, I forwarded a drawing of the cephalothorax to Dr. T. Thorell (of Upsala), by whom the typical example, described by Westring ('*Araneæ Suecicae*,' p. 213), was found in Sweden ; Dr. Thorell, in reply, confirms my conjecture as to its specific identity. Since that time, M. Simon has, in January 1874, kindly sent me another adult example of the same sex, found by himself at Bourg-d'Oisans, France.

*ERIGONE HETEROGASTER*, sp. n. (Plate XXIX. fig. 19.)

Adult male, length rather less than 1 line.

The *cephalothorax* is of a dark yellowish brown colour ; it is small in comparison with the size of the abdomen ; the occipital region is elevated into a large roundish knob-like eminence ; and on either side, at its fore part, separating it from the caput, is a large and deep horizontal oval excavation, almost perforating the base of the eminence ; these lateral excavations, like the corresponding ones in many other species, taper backwards, and run out near the hinder part of the occiput ; the ordinary converging grooves of the thorax are indicated by fine blackish lines and not very distinct roundish punctures ; the occipital eminence is smooth, glossy, and its upper and fore sides are furnished with a few short hairs ; the fore part of the caput, forming its lower and rather the smallest segment, is rather prominent, the clypeus retreating, and less in height than half that of the facial space, and its upper part is also furnished with some short hairs.

The *eyes* are small and tolerably equal in size ; they are in the usual four pairs ; those of the upper (or hinder) pair are placed widely apart (rather more than three diameters) on the fore part, at the upperside, of the occipital eminence ; those of each lateral pair are contiguous to each other, and placed rather obliquely on either side of the lower segment of the caput ; between the lateral pairs, and

in the same straight line, is the fore central pair, the eyes of which are rather larger than usual and not quite contiguous to each other; each of them is separated from the fore lateral on its side by a little more than the diameter of the latter. All the eyes form a quadrilateral figure, longer than broad, and its hinder side longer than its fore side.

The *legs* are moderate in length, their relative length being 4, 1, 2, 3; they are slender, of an orange-yellow colour, and sparingly furnished with short hairs.

The *palpi* are short, slender, and similar in colour to the legs; the cubital joint is of moderate length, gradually converging from its fore extremity to its hinder one; the radial joint is short, rather dilated, and has its fore extremity on the upperside produced into a longish, rather slender, nearly straight, slightly tapering, not very sharp-pointed apophysis, having the same general direction as the cubital joint; the digital joint is small, and of the ordinary oval form; the palpal organs are neither very prominent nor complex; they have a small black filiform coiled spine at their fore extremity, but otherwise they present no remarkable feature.

The *falces* are small, straight, nearly perpendicular, similar in colour to the cephalothorax, and armed with a few minute teeth towards the extremity on their inner surface.

The *maxillæ* and *labium* are of normal form, and similar in colour to the falces.

The *sternum* is of a deep brown colour, and its surface is marked with roundish punctures.

The *abdomen* is large, of broad oval form; along the middle of the fore half of the upperside is an oval coriaceous patch of a darkish yellow-brown colour; the hinder part of this patch is the most obtuse; on either side, and throughout its whole length, the abdomen is dilated, forming a kind of cushion, which rises above the central portion; these dilations are of a dull yellowish whitish-brown colour, obscurely mottled with largish spots of a deeper hue; the hinder part of the central portion is of a dull browish colour, with some obscure, pale, transverse curved lines, perhaps visible only in spirit of wine. The spinners are enclosed in a sort of short, sheath-like case, split into several portions.

The adult female is rather larger than the male, but is similar in general form and colouring; the cephalothorax, however, has no trace of the occipital eminence; and the relative length of the legs is different, 1, 4, 2, 3; the abdomen has the same peculiarity of form, but not so marked in its character, and the oval coriaceous patch on the fore part of the upperside is wanting. The form of the genital aperture is characteristic (see *f*, fig. 19, Plate XXIX.).

An adult example of each sex of this very distinct species (which may be easily distinguished by the form of the abdomen alone) was received from M. Eugène Simon, by whom it was found at Morocco.

*ERIGONE THORACATA*, sp. n. (Plate XXIX. fig. 20.)

Adult male, length  $\frac{2}{3}$  of a line.

The *cephalothorax* of this species is of a deep brown colour; the

sides of the thoracic region are marked with numerous roundish punctures; and the fore part of the caput is bold and prominent, with a strong and pretty high eminence on its occipital portion; on each side of this eminence, at its fore part, just behind the lateral pairs of eyes, is a short, somewhat oval, indentation, running backward towards the occiput; the clypeus is rather full, but retreating, and slightly exceeds in height half that of the facial space; when looked at in front the occipital eminence is distinctly divided into two lobes by a longitudinal valley or indentation; these lobes (looked at from the same point) have a direction slightly divergent from each other. The fore side of the occipital eminence, as well as the upper part of the caput in front of it, is clothed with a few short prominent hairs.

The *eyes* are small and in the usual position; those of the hind central (or upper) pair are placed on the fore part of the summit of the occipital eminence, or one on each of the lobes into which it is divided; they are thus very widely separated from each other, and form a transverse line rather longer than that formed by the three other pairs, which are seated at the upper fore extremity of the caput itself; those of each lateral pair are slightly obliquely placed, and are contiguous to each other, the foremost being separated from the fore central eye nearest to it by the space of an eye's diameter; the eyes of the fore central pair are the smallest of the eight, but not quite contiguous to each other.

The *legs* are short, moderately strong, and of a yellow-brown colour, tinged with reddish; they are furnished with hairs and a very few slender erect bristles; and their relative length is 4, 1, 2, 3.

The *palpi* are of moderate length and strength; their colour is pale yellow-brown: the cubital joint is strong, its fore extremity much stronger than its hinder one, and it is also much longer than the radial joint; this latter is very short and weak, but has its fore extremity on the inner side produced into a longish, curved, tapering apophysis, whose point is directed outwards; and opposed to it is a small prominent, obliquely truncated projection, which springs from the outer side of the extremity of the joint; the digital joint is rather small, but of ordinary form; the palpal organs are prominent and rather complex, with a somewhat circularly curved, reddish brown spine connected with their fore extremity.

The *falces* are small, directed backwards, and armed with a few very minute teeth towards their extremities on the inner sides; their colour is similar to that of the cephalothorax.

The *maxillae* and *labium* are similar in colour to the falces, and of normal character in other respects.

The *sternum* is of ordinary form, but very convex; and its surface, though glossy, is thickly covered with small, round, shallow punctures; its colour is similar to that of the cephalothorax.

The *abdomen* is of tolerable size, not particularly convex above, but projects closely and considerably over the base of the cephalothorax; its upperside is completely covered by a dark, rich yellow-brown, coriaceous epidermis, pretty thickly marked with roundish

punctures, and clothed thinly with short hairs; the sides (below the coriaceous epidermis of the upper part) are yellowish, marked with indistinct longitudinal bars of a blackish hue; the spiracular plates, and a portion of the surface surrounding the spinners, are of a red-brown colour, the rest of the underside being coloured like the sides.

The *adult female* is rather larger than the male, and wants the occipital eminence, the coriaceous epidermis of the abdomen is of a similar nature, but does not extend so far backward. The genital aperture is, as usual, of characteristic form (see *d*, fig. 20).

This species is nearly allied to *Erigone nemoralis* (Bl.); but the male may be at once distinguished by the strongly bilobed form of the occipital eminence, this peculiarity being scarcely perceptible in that species; another closely allied species also—*E. pavida* (Cambr.), found in Palestine—may be distinguished by the perfectly confluent form of the upperside of the occipital eminence; and from both these species the present one differs in the form of the palpi and structure of the palpal organs.

An adult example of each sex was received from M. Eugène Simon, by whom they were found near Troyes, France.

*ERIGONE CORRUGIS*, sp. n. (Plate XXIX. fig. 21.)

Adult male, length rather under 1 line (about  $\frac{1}{13}$  of an inch).

The colour of the *cephalothorax* of this Spider is yellow-brown; the thoracic region suffused with dusky blackish, and the lateral margins edged with black; the *sternum* is rather darker, while the *falces*, *maxillæ*, and *labium* are similar to the *cephalothorax* in colour, the legs and palpi being pale yellow. The *caput* has its fore part full, bluff, and rounded; on the upperside towards the occiput is a tolerably strong eminence, of a somewhat bent form (looked at in profile), and directed forwards; this is caused by a strong indentation or excavation in front at its lower part where the *caput* proper begins; this excavation is a good deal obscured by numerous short bristly hairs, which, springing from the fore part of the eminence as well as from the *caput* below, meet across it. A considerable portion of the upperside of the fore part of the *caput* is clothed with short hairs, including the two lateral as well as the lower central pair of eyes. There are also two longish erect bristly hairs in the median line of the upper part of the *cephalothorax*—one at the base behind the occipital eminence, the other at the thoracic junction.

The *eyes* are small, in the ordinary position; those of the upper pair, separated from each other by no more than an eye's diameter, are placed in front on the upperside of the occipital eminence; those of each of the other three pairs, respectively, are contiguous to each other, and placed in a transverse straight line comprising the whole width of the fore part of the *caput* just below the gap between it and the occipital eminence; the eyes, looked at from the front, thus form a subtriangular figure, whose base is longer than a perpendicular line let fall upon it from the obtuse angle formed by the upper pair of eyes; the height of the clypeus exceeds half that of the facial space.

The *legs* are of tolerable length, slender, thinly furnished with hairs and fine bristles, of which last there are several short erect ones on the uppersides of the tibial joints; they are not very different in length; but those of the third pair are the shortest.

The *palpi* are of moderate length; the cubital joint is longer than the radial, and its fore part is stronger than its hinder extremity; the radial joint is short but strong, and the fore extremity on the upperside is produced into a long strong, somewhat bent, apophysis, the extremity of which terminates in a hook whose point is directed outwards; the radial joint, together with its apophysis, rather exceeds the cubital joint in length; the digital joint is of moderate size, and oval form; the palpal organs are prominent, complex, and have a slender, coiled, filiform spine at their extremity.

The *falces* are small, rather divergent, strongly inclined backwards towards the sternum, and armed towards their extremity on their inner sides with minute teeth.

The *maxillæ*, *labium*, and *sternum* are normal in form.

The *abdomen* projects considerably over the base of the cephalothorax; it is of an oval form, and moderately convex above; its colour is black, with some mottlings and chevron-like markings visible (perhaps only) in spirit of wine, and of a yellowish colour; it is thinly clothed with hairs, and the hinder part of the upperside is transversely wrinkled, the folds of the epidermis being rather marked and characteristic.

The adult female resembles the male in general characters, and also in the transverse folds of the hinder part of the upperside of the abdomen (these, however, are fewer in number than in the male); but the colours are darker, the legs being shorter, stouter, and tinged with orange-red. The cephalothorax is of ordinary form, no traces of the cephalic eminence being visible, the eyes being consequently more closely grouped together, and the relative position of the different pairs altered; the clypeus is rounded and prominent; the occiput has also a very slight shining convexity, and immediately behind it is a largish dark blackish patch, from which obscure blackish lines radiate, indicating the normal grooves and indentations. The genital aperture is characteristic (fig. 21, *f*).

An adult example of each sex was received from M. Eugène Simon, by whom they were found in Corsica. It is a very distinct species, bearing some resemblance to *Erigone fuscipes* (Bl.), but perhaps more nearly allied to *E. fastigata* (Bl.).

ERIGONE BIOVATA, sp. n. (Plate XXIX. fig. 22.)

Adult male, length  $\frac{3}{4}$  of a line.

The whole of the fore part of this Spider, both above and underneath, is of a pale straw-colour. The cephalothorax strikes one at once as very similar to that of *E. bifrons* (Bl.); the fore part of the caput is broad, boldly rounded below and elevated above, being divided longitudinally by a deepish valley into two somewhat oviform lobes; a large deep oval excavation, narrowing to a point at the occiput, divides the lobes on either side from the lower part of the

caput; and within the excavation at its larger end, just behind the hind lateral eye, is a shining, silvery, roundish spot; the clypeus is full and prominent, its height appearing slightly to exceed half that of the facial space; a few short hairs directed downwards are disposed on the space between the fore and hind central pairs of eyes.

The *eyes* are very minute, but disposed in the usual four pairs, and seated on black spots; those of the upper or hind central pair appear to be the smallest of the eight; they are seated just in front of the summit of the cleft which divides the two lobes of the caput, and each is about an eye's diameter on one side of a dark, yellow-brown, longitudinal line running along the bottom of the cleft; the other three pairs of eyes are in a nearly straight transverse line at the upper part of the lower segment of the caput; those of the fore central pair are rather larger than those of the hind central, contiguous to each other, dark-coloured, and forming a line not quite as long as those of that pair. The eyes of each lateral pair are placed obliquely, but not quite contiguous to each other, the fore laterals being the largest of the eight, and each is separated by about a diameter's distance from the eye nearest to it of the fore central pair; the distance between the fore and hind central pairs is about equal to that from between the eyes of one lateral pair to between those of the other; looked at in front the fore laterals and fore centrals form a straight transverse line.

The *legs* are moderate in length and strength; their relative length apparently 4, 1, 2, 3, though the difference between those of the first and fourth pairs is exceedingly small; they are furnished with hairs; and each has one or two short prominent dark bristles on the uppersides.

The *palpi* are rather short and slender; the cubital is longer but less strong than the radial joint: this latter has its fore extremity on the upperside rather expanded, with two small prominent points, or the fore extremity may be described as having its upper margin emarginated; the digital joint is small, and the palpal organ prominent and well-developed, but not very complex, with a minute curved, dark, filiform tapering spine at their extremity. The *maxillae*, *labium*, and *sternum* present no unusual feature either in form or structure.

The *falces* are moderate in length and tolerably strong; they are inclined backwards to the labium, and are armed with a few small sharp teeth towards the extremity on their inner margins.

The *abdomen* is of ordinary form, and projects (but not greatly) over the base of the cephalothorax; it is of a dull brownish yellow colour, a large oval patch at the hinder extremity on the upperside being pale luteous (this may, however, be accidental) and thinly clothed with hairs.

Although allied to *E. bifrons* (Bl.), it may easily be distinguished by the greater development and wider spread of the ovate lobes of the caput, as well as by a totally different position of the eyes, which are much smaller, and by a different colouring of the whole



Spider; the form and structure of the palpi and palpal organs are also different.

A single adult male was received from M. Simon, by whom it was captured at Rouen.

ERIGONE BUCEPHALA, sp. n. (Plate XXIX. fig. 23.)

Adult male, length  $1\frac{1}{4}$  line; length of the female  $1\frac{1}{2}$  line.

The *cephalothorax* is of a bright reddish orange-yellow colour, the caput being strongly tinged with brown; the thorax is covered with dark, conspicuous punctures, disposed mostly in converging lines, which follow the course of the normal indentations; towards the margins these punctures are less regularly placed: the caput is elevated and prominent; the fore extremity, being the upper portion of the clypeus, projects forwards in a bold, obtuse, nose-like form, slightly bent downwards; and on the occiput is a large, almost globular eminence, deeply cut away or indented on either side of the fore part at its base, the indentation extending backwards for about half its width; the upper part of this eminence has a few short erect hairs on its smooth and glossy surface; and some more conspicuous hairs are also disposed along the middle of the ocular area in a longitudinal direction; those above the indentations are directed downwards, those below upwards; the lower part of the clypeus is strongly retreating.

The *eyes* are in the usual four pairs; and in this species the pairs are rather widely separated from each other—one pair (in a transverse line) on the fore part of the top of the globular eminence, about two diameters distance from each other, another pair on either side, a little below the indentation which divides the eminence from the lower segment of the caput; the eyes of each of these pairs are on a small tubercular eminence respectively, and are contiguous to each other: the fourth pair is placed just at the commencement of the nose-like prominence; these are the smallest of the eight, dark-coloured, and are very near, if not contiguous, to each other: the ocular area is thus very large, its length also being greater than its breadth.

The *legs* are moderate in length and strength, their relative length appearing to be 4, 1, 2, 3; they are of a bright orange-yellow colour, tinged with reddish, and are furnished with hairs and a very few fine erect bristles; these last are more conspicuous in the female, being of a spinous nature.

The *palpi*, except the radial and digital joints, which are dark brownish-yellow, are similar in colour to the legs; they are moderately long, but strong, the humeral and cubital joints being very nearly as strong as the femora of the first pair of legs: the cubital is long, strong, bent downwards, and slightly larger at its fore than at its hinder extremity: the radial is exceedingly short, and not nearly so broad as the fore extremity of the cubital joint; it has its fore extremity on the upperside produced into a longish apophysis, whose extremity is emarginate or bifid, the outer limb of the bifid portion being prominent, sharpish-pointed (with a short, spine-

like hook, not easily seen, at its extreme point), and much longer than the other; from the outer side of the radial joint there issues a short, slightly curved, tapering, sharp-pointed, blackish spine; the whole length of the radial joint and its apophysis is less than that of the cubital: the digital joint is rather large, somewhat roundly truncate at its hinder extremity: the palpal organs are very prominent, highly developed and complex; at their base, near the outer side, is a circularly curved, reddish spiny process; about the middle of their outer side is a large, somewhat globular, whitish corneous lobe, in front of which is a circularly curved, black, flattish spine, its prominent extremity obtuse and bifid; and within its curvature is a prominent, obtuse, corneous process.

The *falces* are rather weak, but of moderate length, and similar to the cephalothorax in colour.

The *maxillæ* are strong, of normal form, and, with the *labium*, similar in colour to the *falces*.

The *sternum* is of a reddish orange-yellow colour, and its surface is covered with punctures similar to those on the thorax.

The *abdomen* is large, oval, and projects considerably over the base of the cephalothorax; it is moderately convex above, and clothed with short bristly hairs; the sides and hinder part are longitudinally rugulose, blackish, with yellowish-brown between the wrinkles; and the upperside is covered with a coriaceous epidermis of a deep blackish bistre-brown colour, thickly set with punctured spots.

The *female* is rather larger than the male, but resembles it in colours and general characters, the thorax and sternum being similarly punctured, and the upperside of the abdomen also covered with a coriaceous punctured epidermis; the occiput is roundly gibbous; and the eyes (as in all other females of this group) more closely massed together; those of the hind central pair being but one diameter's distance from each other; the form of the genital aperture is, as usual, characteristic, being of a somewhat triangular shape.

An adult example of each sex was received, in January 1872, from M. Simon, by whom they were found in Corsica.

ERIGONE PROTUBERANS, sp. n. (Plate XXIX. fig. 24.)

Adult male, length nearly  $1\frac{1}{4}$  line.

This Spider is allied to *E. latifrons* (Camb.); but its caput is less distinctly divided into two segments by a longitudinal indentation over the summit of its elevated portion. The clypeus, whose height is half that of the facial space, is furnished with some hairs just below the fore central pair of eyes; the space clothed with hairs is defined by being rather darker than the rest; the palpal organs are complex, and, besides several irregular corneous processes, a sharp-pointed, strongish, filiform spine issues from their extremity on the outer side, and, curving upwards and backwards, has its sharp point near their centre, more than halfway towards the hinder extremity of the digital joint and below the hinder part of the radial joint; this joint is strong though shorter than the cubital, and

has the whole width of its fore extremity on the upperside produced into a remarkably strong apophysis, whose extremity on the inner side is rounded and sharply curved, with its sharp corneous, somewhat beak-like point directed outwards.

The colour of the cephalothorax is dark yellowish brown, paler on the upper part of the caput, the legs and palpi being tinged with a brighter yellow hue.

The *fulces*, *maxillæ*, and *labium* are similar in colour to the cephalothorax; the *sternum* is black-brown, and the *abdomen* black.

A single example was received for examination from M. Eugène Simon, by whom it was found on the Pyrenees in the autumn of 1872. The above description, though short, will with the figures given, suffice to distinguish this Spider from its congeners.

ERIGONE CASTELLANA, sp. n. (Plate XXIX. fig. 25.)

Adult male, length 1 line.

The *cephalothorax* of this exceedingly remarkable species is of a yellow-brown colour, rather suffused with blackish brown on the thoracic portion, the normal grooves and indentations being also indicated by converging blackish lines. The caput is elevated, and has upon its summit a distinct elevation of large and disproportionate dimensions, and of a clearer and rather paler colour than the rest of the cephalothorax; looked at from the front it has a somewhat balloon-shaped appearance, and in profile it is somewhat flattened in front and globular behind, and the whole has a backward direction; the front is not only flattened, but strongly and deeply indented. Had it not been for the symmetrical form of this indentation, I should have considered it to have been the result of accident; whether or not it be normal can only be certainly proved by the examination of other examples; but after carefully examining the only example before me I am inclined to believe it to be a constant character. This curious "supercephalic" eminence has a somewhat bladder-like, semidiaphanous appearance, as if destitute of the solidity of the ordinary cephalothoracic surface, and is thinly clothed with fine prominent hairs: when looked at in profile, the supercephalic elevation has, close above its junction with the ordinary eminence of the caput, a deep depression, with a somewhat semicircular perforation at its deepest part: whether this perforation is complete or not it was difficult to ascertain with certainty; but it appeared to be so.

The *eyes* are seated in the usual four pairs on the ordinary cephalic elevation; one pair on the summit, close on either side of the perforation above noticed; below these, on either side in an oblique line, whose lower end is directed forwards, is each lateral pair, the eyes of which are contiguous; and considerably above the straight line of the lateral pairs is the fore central pair, the eyes of which are smallest of the eight, obscure, dark, and not quite contiguous to each other.

The *legs* are moderately long, slender, of a dull orange colour, furnished with hairs; their relative length 4, 1, 2, 3; the femora of the first and second pairs have on their fore sides a few spines

(in a single longitudinal row) of graduated lengths and strength, the longest and strongest being furthest from the fore extremity of the joint; some short bristles continue this row of spines towards the hinder extremity: these spines are very characteristic, being unusual in Spiders of this group of the genus.

The *palpi* are moderate in length and strength, and similar in colour to the legs. The cubital joint is slightly bent and rather clavate, or larger at its fore than at its hinder extremity; the radial joint is shorter and less stout than the cubital, and has its fore extremity on the upperside produced into an apophysis with a forked or bifid termination, the outer limb of the bifid part being of a tapering form, prominent, and very slightly but sharply hooked at its point, while the inner limb is shorter and depressed (it requires some care in examination to see this bifid portion correctly); the digital joint is of moderate size, and roundish oval form; the palpal organs are well developed and complex, with various corneous processes, one, at their fore extremity, being jet-black and of a somewhat T-like form.

The *falces* are small, rather divergent, and similar in colour to the supercephalic eminence.

The *maxillæ* and *labium* are of normal character, and, with the *sternum*, which is very glossy and convex, of a dark yellow-brown colour—the extremities of the *maxillæ* and *labium* being pale, and the *sternum* being the deepest in hue, and furnished with a few long bristle-like hairs.

The *abdomen* is large, much longer than the cephalothorax, moderately convex above, and of a jet-black colour; its surface appeared to be, on the lower part of the sides and behind, somewhat longitudinally rugulose; it is clothed very sparingly with short yellowish hairs.

The *female* resembles the male in colours; but the caput is much less elevated, and the supercephalic eminence is represented by a very slight occipital gibbosity. The legs of the first and second pairs have the same characteristic spines on the femoral joints; there are also other slender erect spines on the uppersides of the genual and tibial joints of all the legs; the genital aperture is of characteristic form, presenting, when looked at from the front, a double-arched aperture.

An adult example of each sex of this curious Spider was received in 1872 from M. Eugène Simon, by whom it was found at Aranjuez, in Spain.

ERIGONE JUSTA, sp. n. (Plate XXIX. fig. 26.)

Adult male, length 1 line.

The *cephalothorax* of this Spider is dark yellowish brown, with some rather irregular, vein-like, converging black markings on the thorax, the lower part of whose sides have a roughened or somewhat granular appearance; the fore part of the caput is elevated into a single eminence, of a somewhat obtuse subconical form, of moderate height, the summit being clothed with short bristly hairs directed

backwards: the height of the clypeus, whose profile-line is rather curved, equals about two thirds of that of the facial space.

The *eyes* are placed in the usual four pairs:—one pair on the summit of the cephalic eminence, not easy to be seen except by looking down upon them; these are about a diameter's distance or rather more from each other; those of each lateral pair are contiguous to each other and placed towards the base of the eminence and about midway between its fore and hinder part; those of the fore central pair are smallest of the eight, dark-coloured and contiguous to each other, and each is separated from the fore lateral eye on its side by an interval about equal to the diameter of the latter: the area formed by the eyes is of a subtriangular or rather of an equilateral triangular form, the hinder angle being truncated by the line formed by the hinder (or upper) pair of eyes.

The *legs* are slender, but moderate in length, their relative length being 4, 1, 2, 3; the femora of the first pair have three small, rather prominent black spines of different lengths in a longitudinal line underneath their fore extremities; the legs are of a dull yellow colour and, except the above-mentioned spines and a corresponding bristle or slenderer spine in a similar situation on the femora of the other legs, are furnished with hairs, only one or two very slender erect ones being on the uppersides.

The *palpi* are similar in colour to the legs, short and not strong; the radial joint is rather shorter but stronger than the cubital, and has its fore extremity on the upperside produced into a short rather blunt-pointed apophysis, whose extremity (looked at in profile) appears to be more sharply pointed and slightly hooked; on the inner side of this apophysis is an angular depressed point, which, in some views of it, gives the extremity of the radial apophysis a bifid appearance: the digital joint is of moderate size and ordinary form: the palpal organs are moderately complex, with a short stout, somewhat corkscrew-shaped, blunt-pointed, black spine at their extremity, and a curved corneous process at their base on the outer side.

The *falces* are small, short, and rather paler in colour than the cephalothorax.

The *maxillæ* and *labium* are of normal form, and of a deep black-brown colour, paler at their extremities.

The *sternum* is similar in colour to the maxillæ, and is of ordinary form, but very convex.

The *abdomen* is rather large, tolerably convex above, and projects strongly over the base of the cephalothorax; its colour is black-brown; and it is clothed thinly with hairs.

An adult male of this Spider, which is allied to *E. frontata* (Bl.), was received from M. Simon, by whom it was found at Troyes in France.

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- Fig. 5. *Erigone habilis* ♂ & ♀, sp. n., p. 195, Plate XXVII. fig. 5. Col de Natoia, France.
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8. — *vaporariorum* ♂ & ♀, sp. n., p. 198, Plate XXVII. fig. 8. Col de Natoia, France.
9. — *corniculans*, ♂ & ♀, sp. n., p. 199, Plate XXVII. fig. 9. Sappey, France.
10. — *nigrolimbata* ♂ & ♀, sp. n., p. 201, Plate XXVIII. fig. 10. Gyl sur Seine, Département de l'Aube.
11. — *leptocuri* ♂, sp. n., p. 202, Plate XXVIII. fig. 11. Algiers.
12. — *stylifrons* ♂, sp. n., p. 203, Plate XXVIII. fig. 12. Corsica.
13. — *eborodunensis* ♂, sp. n., p. 204, Plate XXVIII. fig. 13. Col de Natoia, France.
14. — *coccinea* ♂, sp. n., p. 205, Plate XXVIII. fig. 14. Morocco.
15. — *foraminifera* ♂, sp. n., p. 207, Plate XXVIII. fig. 15. Col de Natoia, France.
16. — *lucasi* ♂, sp. n., p. 208, Plate XXVIII. fig. 16. Algiers.
17. — *inedita* ♂ & ♀, sp. n., p. 209, Plate XXVIII. fig. 17. Paris.
18. — *capito* (Westr.) ♂, p. 210, Plate XXVIII. fig. 18. Paris and Bourg d'Oisans.
19. — *heterogaster* ♂ & ♀, sp. n., p. 211, Plate XXIX. fig. 19. Morocco.
20. — *thoracata* ♂ & ♀, sp. n., p. 212, Plate XXIX. fig. 20. Troyes, France.
21. — *corrugis* ♂ & ♀, sp. n., p. 214, Plate XXIX. fig. 21. Corsica.
22. — *biuvata* ♂, sp. n., p. 215, Plate XXIX. fig. 22. Rouen.
23. — *bucephala* ♂ & ♀, sp. n., p. 217, Plate XXIX. fig. 23. Corsica.
24. — *protuberans* ♂, sp. n., p. 218, Plate XXIX. fig. 24. Pyrenees.
25. — *castellana* ♂ & ♀, sp. n., p. 219, Plate XXIX. fig. 25. Aranjuez, Spain.
26. — *justa* ♂, sp. n., p. 220, Plate XXIX. fig. 26. Troyes.

## EXPLANATION OF THE PLATES.

## PLATE XXVII.

- Fig. 1. *Erigone retroversa* ♂.  
*a*, profile of cephalothorax, with legs and palpi truncated; *b*, front view of caput and falces; *c*, right palpus, from inner side in front; *d*, left palpus, from outer side; *e*, natural length of Spider.
2. *Erigone consimilis* ♂.  
*a*, profile, with legs and palpi truncated; *b*, front view of caput and falces; *c*, right palpus, from outer side; *d*, leg of first pair; *e*, natural length of Spider.
3. *Erigone longiuscula*.  
*a*, profile, with legs and palpi truncated; *b*, caput and falces, from the front; *c*, caput, from behind; *d*, left palpus, from inner side in front; *e*, natural length of Spider.
4. *Erigone truncatifrons* ♂.  
*a*, profile, with legs and palpi truncated; *b*, caput and falces, from the front; *c*, left palpus, from the front; *d*, ditto, from outer side; *e*, natural length of Spider.
5. *Erigone habilis* ♀.  
*a*, profile, with legs and palpi truncated; *b*, caput and falces, from the front; *c*, genital aperture; *d*, natural length of Spider.
6. *Erigone dorsuosa* ♂.  
*a*, profile, with legs and palpi truncated; *b*, caput, from the front; *c*, left palpus, from behind and rather above; *d*, right palpus, from outer side; *e*, natural length of Spider.
7. *Erigone antennata* ♂.  
*a*, profile, with legs and palpi truncated; *b*, caput and falces, from the

front; *c*, portion of left palpus, from outer side; *d*, right palpus, from outer side; *e*, natural length of Spider.

Fig. 8. *Erigone vaporariorum* ♂ & ♀.

*a*, profile of ♂, with legs and palpi truncated; *b*, caput and falces of ♂, from the front; *c*, fore part of caput (♂), from behind; *d*, right palpus (♂), from the front; *e*, natural length of Spider; *f*, genital aperture (♀).

9. *Erigone corniculans* ♂ & ♀.

*a*, profile of cephalothorax (♂), with legs and palpi truncated; *b*, upper part of caput, from above; *c*, right palpus, from above and behind; *d*, apophysis at extremity of radial joint; *e*, genital aperture (♀); *f*, natural length of ♂; *g*, right palpus of *Erigone monoceros*, Wider, from above and behind.

#### PLATE XXVIII.

10. *Erigone nigrolimbata* ♂ & ♀.

*a*, profile (♂), with legs and palpi truncated; *b*, caput and falces (♂), from the front; *c*, right palpus (♂), from outer side in front; *d*, digital joint (♂), from the front; *e*, genital aperture (♂); *f*, natural length of ♂.

11. *Erigone lepreuri* ♂.

*a*, profile, with legs and palpi truncated; *b*, caput, from the front; *c*, right palpus, from outer side; *d*, part of left palpus, from the front; *e*, radial joint of right palpus, from outer side; *e'*, tooth-like spine beneath extremity of radial apophysis; *f*, natural length of Spider.

12. *Erigone stylifrons* ♂.

*a*, profile, with legs and palpi truncated; *b*, caput and falces, from the front; *c*, left palpus, from the front; *d*, right leg of first pair, from outer side; *e*, one of the bent spines in centre of ocular area; *f*, natural length of Spider.

13. *Erigone ebordunensis* ♂.

*a*, profile, with legs and palpi truncated; *b*, caput, from the front; *c*, right palpus, from outer side; *d*, left palpus, from the front; *e*, natural length of Spider; *f*, right palpus, from above and behind.

14. *Erigone coccinea* ♂.

*a*, profile, with legs and palpi truncated; *b*, caput, from the front; *c*, outline of part of left palpus, from the front; *d*, right palpus, from outer side; *e*, natural length of Spider.

15. *Erigone foraminifera* ♂.

*a*, profile, with legs and palpi truncated; *b*, caput, from the front; *c*, right palpus, from above and behind; *d*, natural length of Spider.

16. *Erigone lucasi* ♂.

*a*, profile, with legs and palpi truncated; *b*, caput and falces, from the front; *c*, left palpus, from above and behind; *d*, right palpus, from outer side in front; *e*, natural length of Spider.

17. *Erigone inedita* ♂ & ♀.

*a*, profile (♂), with legs and palpi truncated; *b*, caput (♂), from the front; *c*, right palpus, from above and behind; *d*, outline of part of left palpus, from outer side; *e*, genital aperture (♀); *f*, natural length of ♂.

18. *Erigone capito* (Westr.) ♂.

*a*, profile, with legs and palpi truncated; *b*, caput, from the front; *c*, left palpus, from outer side; *d*, natural length of Spider.

#### PLATE XXIX.

19. *Erigone heterogaster* ♂ & ♀.

*a*, profile (♂), with legs and palpi truncated; *b*, caput and falces (♂), from the front; *c*, abdomen (♂), from above and behind; *d*, *e*, left palpus (♂), from two points of view, on inner side; *f*, genital aperture of ♀; *g*, natural length of ♂.

Fig. 20. *Erigone thoracata* ♂ & ♀.

*a*, profile (♂), with legs and palpi truncated; *b*, caput and falces (♂), from the front; *c*, left palpus (♂), from inner side and rather in front; *f*, ditto, from outer side; *d*, genital aperture (♀); *e*, natural length of Spider (♂).

21. *Erigone corrugis* ♂ & ♀.

*a*, profile, with legs and palpi truncated; *b*, caput and falces (♂), from the front; *c*, right palpus (♂), from outer side and rather in front; *d*, ditto, from above and behind; *e*, natural length of Spider (♂); *f*, genital aperture of ♀.

22. *Erigone biovata* ♂.

*a*, profile, with legs and palpi truncated; *b*, caput and falces, from the front; *c*, caput, from above and behind; *d*, left palpus, from the front; *e*, part of right palpus, from outer side; *f*, natural length of Spider.

23. *Erigone bucephala* ♂ & ♀.

*a*, profile (♂), with legs and palpi truncated; *b*, caput (♂), from the front; *c*, left palpus (♂), from above and behind; *d*, genital aperture (♀); *e*, natural length of ♂.

24. *Erigone protuberans* ♂.

*a*, profile, with legs and palpi truncated; *b*, caput and falces, from the front; *c*, right palpus, from inner side; *d*, left palpus, from rather on inner side in front; *e*, natural length of Spider.

25. *Erigone castellana* ♂ & ♀.

*a*, profile (♂), with legs and palpi truncated; *b*, caput (♂), from the front; *c*, upper part of caput (♂), from behind; *d*, right palpus (♂), from outer side, above and in front; *e*, genital aperture (♀); *f*, natural length of ♂.

26. *Erigone justa* ♂.

*a*, profile, with legs and palpi truncated; *b*, caput, from the front; *c*, ditto, above and in front; *d*, part of right leg of first pair, from outer side; *e*, right palpus, in front and rather on the inner side; *f*, left palpus, from outer side; *g*, natural length of Spider.

### 3. Second Report on Collections of Indian Reptiles obtained by the British Museum. By Dr. ALBERT GÜNTHER, F.R.S., V.P.Z.S.

[Received March 1, 1875.]

(Plates XXX.-XXXIV.)

The following notes are taken from specimens collected by Lieut.-Col. Beddome in Southern India, and by the late Dr. Jerdon in Northern India and the Himalayas. Besides descriptions of some new species, I have made some short remarks on others recently named and described—not with the object of correcting nomenclature, but rather with the view of inviting the authors of those species to reconsider the characters on which they have based them. The Batrachians will be treated of in a separate paper.

Lieut.-Col. Beddome's collection contained all the specimens obtained by him during his residence in India, more especially the types of the numerous interesting forms discovered and described by him. Perhaps there is now no other part of India the reptilian fauna of which is better known than the district explored by this indefatigable collector.

When Dr. Jerdon left India, he had the intention of publishing a



volume on Indian reptiles similar to his works on the Mammals and Birds of India. To obtain a collection of Himalayan reptiles, with which he was least familiar, he undertook a journey into the Himalayas and Khassya. He collected a considerable number of specimens, which he brought with him to England and presented to the Trustees of the British Museum. The work of systematically arranging and naming this collection was carried on jointly by him and myself, and had proceeded as far as the genus *Tropidonotus*, when it was interrupted by the illness from which he never recovered. Being able to trust to his wonderful memory, he had not always taken the precaution of labelling the specimens with the locality where he obtained them; and I am therefore ignorant of the habitat of a part of the specimens which were still unexamined at the time of his death.

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CABRITA BRUNNEA, Blanford, Journ. As. Soc. 1870. p. 335.

Seven specimens from various localities, collected by Mr. Blanford and Col. Beddome, do not seem to me to differ from *C. leschenaultii*.

#### OPHIOPS.

To this genus I refer:—

1. OPHIOPS JERDONII (Blyth) = *Cabrila jerdonii* (Bedd., Blanf.) = *Pseudophiops theobaldi* (Jerd. P. A. S. B. 1870, p. 71) = *Ophiops bivittatus* (Bedd.).

2. OPHIOPS BEDDOMII (Jerd. P. A. S. B. 1870, p. 71) = *Ophiops monticola* (Bedd. Madr. Journ. Med. Sc. 1870).

#### MOCOA TRAVANCORICA (Bedd.)

is represented by a series of specimens of different ages in Col. Beddome's collection; it is scarcely distinguishable from *M. bilineata* (Gray).

#### RISTELLA RURKII (Gray).

Specimens found by Col. Beddome in the Toracada valley (alt. 4000–5000 ft.) agree so well with the few notes by which this species has been characterized, that I am inclined to refer them to it. It is very distinct from *R. travancorica* (Bedd.).

#### EUPREPES BEDDOMII, Jerd. P. A. S. B. 1870, p. 73.

is not specifically distinct from *Tiliqua rufescens*.

#### EUPREPES (TILIIQUA) BREVIS.

Eye-lid scaly; a pair of supranasal shields; the præfrontal is broadly in contact with the rostral and vertical. The fifth upper labial is below the orbit and much longer than high. Opening of the ear of moderate width, without tubercles in front. Scales with three, and in adult specimens with five strong keels, in 29 longitudinal and 25 transverse series (the latter counted from the axil of the fore leg to the vent). Præanal and subcaudal scales not enlarged.

Body remarkably short, limbs of moderate strength. Brownish-olive above, sides black, lower parts greenish.

There were three specimens of this species in Col. Beddome's collection. The larger (which is adult) was obtained in the Anamallay Mountains, the two smaller ones in Travancore. The former is  $4\frac{1}{4}$  inches long, the body measuring  $1\frac{3}{4}$  inch.

#### HEMIDACTYLUS COCTÆI.

I have referred to this species:—

1. *Hemidactylus bengaliensis*, Anders. J. A. S. B. 1871, p. 14, of which I have examined a specimen sent by Dr. Anderson to Col. Beddome.

2. *Hemidactylus giganteus*, Stoliczka, J. A. S. B. 1872, p. 99, of which a specimen was given by Mr. Blanford to Col. Beddome.

3. *Doryura berdmorei* of Blyth and others, which appears to be founded on young examples of this species.

#### GECKO ANAMALLENSIS.

*Upper parts uniformly covered with rather coarse granulations, without larger tubercles*; scales of the middle of the abdomen in about 30 longitudinal series; no femoral or præanal pores; nine upper and seven lower labials; the front pair of chin-shields are smaller than the first lower labial. Tail slightly depressed, with a series of broad subcaudals. *Neither the fingers nor the toes are webbed.* No fold of the skin in the ham. Greyish brown above, clouded with darker.

A single specimen was found by Col. Beddome in the Anamallay Mountains; it is  $3\frac{1}{2}$  inches long, the body measuring  $1\frac{1}{4}$  inches.

#### GONIODACTYLUS WYNADENSIS.

*Gymnodactylus wynadensis*, Bedd. Madr. Journ. Med. Sc. 1870, = *G. maculatus*, Bedd. *ibid.*

#### GYMNODACTYLUS LITTORALIS (Jerd.),

= *Gymnodactylus planiceps*, Beddome, Madr. Journ. Med. Sc. 1871.

#### GYMNODACTYLUS GRACILIS (Bedd.)

is probably the lizard to which Mr. Jerdon had previously applied the name of *G. malabaricus*.

#### GYMNODACTYLUS NEBULOSUS (Bedd.).

I regard *G. nebulosus*, *collegalensis*, and *speciosus* of Beddome as varieties of colour of the same species.

#### CALOTES GRANDISQUAMIS. (Plate XXX.)

A single uninterrupted series of four or five spines above the tympanum, anteriorly passing into a row of scales which are larger than the others on the temple, and extend forward to the eye. Dorsal crest well developed, composed of compressed spines, long in the adult male, shorter in younger males and in the female; this crest

becomes lower posteriorly on the trunk, but is continued to the basal portion of the tail in the male, whilst it disappears behind the middle of the trunk in the female. *Scales on the side of the body exceedingly large*, nearly four times the size of those on the abdomen; a transverse series in the middle of the trunk is composed of not more than seven scales. A fold in front of the shoulder.

An immature male (body 4 inches long) is green, with five broad black cross-bands, each scale within the bands having an orange-coloured spot in the middle; tail with broad blackish rings; lips yellowish green.

In an adult male (body  $5\frac{1}{2}$  inches long) only traces of the two middle bands remain, nearly the whole of the upper parts being uniformly green; lips yellowish.

The adult female is uniform green.

Three specimens were found by Col. Beddome at the foot of the Canoot Ghat; the largest is 18 inches long, the body measuring  $5\frac{1}{2}$  inches.

#### ONYCHOCEPHALUS ACUTUS.

I do not find any character by which *O. malabaricus* (Beddome) can be distinguished from this species.

#### SILYBURA.

The following is a synopsis of all the species known, prepared with the assistance of the numerous examples in Col. Beddome's collection.

##### I. *Scales in nineteen rows.*

- A. Ventral scutes 205–214. Snout pointed; nasals not separated by the rostral. Caudal disk convex. Sooty black above, reddish below, the two colours encroaching upon each other in a zigzag line, and the black forming cross bars on the anterior part of the abdomen; a reddish spot on the cheek.

##### 1. *Silybura grandis*

(Beddome): Anamallays, 4000 feet.

- B. Ventral scutes 166–169. Snout pointed; nasals separated by the rostral, which is about as long as the vertical. Head very small; vertical rather broad. Caudal disk more or less convex. Upper parts reddish violet or purplish, with irregular transverse rows of (sometimes very indistinct) yellowish ocellated specks. Abdomen deep black, this colour being separated from that of the upper parts by a yellow band commencing at the angle of the mouth, and broken up in spots behind, or entirely replaced by an irregular row of spots. A yellow band on each side of the lower part of the tail.

##### 2. *S. melanogaster*, sp. n.

(Plate XXXI. fig. A.)

Two specimens from the Anamallays and Travancore.

II. *Scales in seventeen rows.*A. *Number of ventral scutes exceeding 160.*a. *Caudal disk flat.*

Ventral scutes 164 s. 166 s. 170. Snout conical; rostral of moderate extent. Brownish black, a more or less regular broad red band runs along each side of the body. Abdomen either entirely black, or with black margins on the scutes ..... 3. *S. rubrolineata* (Beddome): Anamallays, Tinnevellys.

b. *Caudal disk convex.*

Ventral scutes 169-177; subcaudals 5-7. Snout acutely pointed; rostral shield long, but not separating the nasals; vertical small. Brown, with a narrow whitish line on the side of the neck; vent white, with scarcely a trace of a lateral band on the tail ..... 4. *S. beddomii* (Günth. Rept. Brit. Ind. p. 190): Anamallays, 3000 to 4500 feet.

Ventral scutes 167, subcaudals 10. Snout obtusely conical; rostral shield of moderate extent; vertical small. Brown, with a whitish line along each side of the neck. A very perfect white band along each side of the lower part of the tail, and crossing the vent ..... 5. *S. ellioti* (Gray, Proc. Zool. Soc. 1858, p. 262): Madras Pres.

Ventral scutes 193, 201, 203. Snout pointed; rostral short. Caudal disk rough with keels. Purplish, ornamented with transverse series of ocellated small spots .. 6. *S. ocellata* (Beddome, Proc. Zool. Soc. 1863, p. 226): Western slope of Nilgherries (3500 feet), Wynad.

Ventral scutes 183. Snout rather obtuse; rostral very short. Tail very convex above and without any keels. Purplish above, ornamented with transverse series of ocellated yellow small spots; abdomen (including the two outer rows of scales) yellow, with numerous irregular black cross bars; tail blackish, with some yellowish spots on each side.

Malabar.

7. *S. liura*, sp. n.  
(Plate XXXI. fig. B.)

B. *Number of ventral scutes less than 160.*a. *Caudal disk flat; snout obtuse.*

Ventral scutes 139-148 (155 twice in 20 specimens). A sooty black is predominant on the upper, and yellowish on the lower parts; sometimes both colours are sharply confined to their respective regions (*S. nilgherriensis*); sometimes the entire animal is blackish; other specimens have the abdomen banded and spotted; and again, in others, the back is ornamented with various yellowish patterns, and the abdomen spotted with black (*S. shortii*).

8. *S. ceylonica*

(Cuv. R. An.) = *S. nilgherriensis* (Bedd. Proc. Zool. Soc. 1863, p. 226, pl. 26. fig. 1) = *S. shortii* (Bedd. l. c. p. 225, pl. 25. fig. 1): Bombay; Dekkan, Nilgherries, Shevaroyes.

Ventral scutes 130–135. Large blood-red spots on the sides of the neck, and one on each side of the vent.

9. *S. rubromaculata*

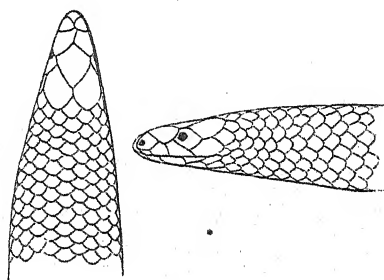
(Beddome).

Ventral scutes 135. A regular narrow yellow band runs along each side of the body ..... 10. *S. bicatenata* (Günth. Brit. Rept. p. 191, pl. 17. fig. H): Dekkan.

Ventral scutes 122–131. Vertical shield broad. Brown above, yellowish on the sides and below, irregularly spotted with brown; sometimes the upper part of the sides ornamented with short yellowish cross bars, which do not extend across the back ..... 11. *S. brevis* (Günth. Brit. Rept. p. 192, pl. 17. fig. D): Anamallays, Nilgherries.

Ventral scutes 128–130. Snout obtusely conical, narrow; rostral very short; hinder part of the vertical much produced. Brown above, lower parts yellow, with irregular

Fig. 1.



*Silybura arcticeps* (magn. 2 diameters).

black cross bars. Lower side of the tail yellow, black in the middle; terminal scute of the tail black.

12. *S. arcticeps*, sp. n.

Tinnevely.

b. *Caudal disk rounded; snout pointed.*

Ventral scutes 144–153. Black, upper parts dotted with white ..... 13. *S. punctata* (Beddome): Pulney hills, Golcondah hills.

PLECTRURUS CANARICUS.

*Silybura canarica*, Beddome.

This species differs from the other species of *Plectrurus* in having

the supraorbital and postorbital confluent; therefore the separation of these shields cannot be continued as a character of *Plectrurus*, which, however, is sufficiently distinguished by the vertically compressed terminal caudal scute.

*PLECTRURUS BREVIS* (Beddome),

= *P. perrotteti*, young.

*MELANOPHIDIUM BILINEATUM* (Bedd.). (Plate XXXII. fig. A.)

The coloration of the adult and young is perfectly the same, except that the lateral band and the lower side of the tail are pure white in the young, whilst in the adult a series of minute black dots runs along the middle of the lateral band, and the lower part of the tail is ornamented by two series of round black spots.

This species occurs in the Wynad, at an altitude of 4000–5000 ft.

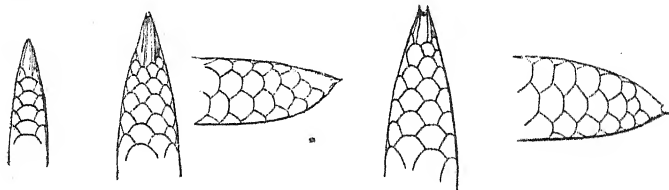
*MELANOPHIDIUM PUNCTATUM* (Bedd.). (Plate XXXII. fig. B.)

In this species the coloration of the adult and young is identical, the sides being ornamented sometimes by two, and sometimes by three longitudinal rows of black spots. But the terminal scale of the tail is subject to a remarkable change: in a specimen 12 inches long it is simply conical (fig. 2); in another, 17½ inches long, it is narrow, provided with two parallel ridges, each ending in a short spine (fig. 3); and, finally, in another of 18 inches, and much thicker

Fig. 2.

Fig. 3.

Fig. 4.



Magnified 2 diameters.

than the second, the terminal scute is compressed, with the ridges as in the second specimen, but with two pairs of short spines, one pair being vertically above the other (fig. 4).

The mental groove is equally developed in all these specimens and species.

This species is found in Travancore, at an altitude of 3000–5000 feet.

*ASPIDURA COPII*, Gthr.

We have received a second example of this species; it was obtained in the district of Dimbola, Ceylon.

*GEOPHIS STENORHYNCHUS*.

Similar in habit to *G. microcephalus*, but with fifteen series of scales. Rostral shield narrow and deep. The two anterior labials

and nasals are much reduced in size by the large loreal, and almost rudimentary. Anterior frontals very small, scarcely one fourth the size of the posterior. Vertical six-sided, as long as broad, with an obtuse anterior angle, and with very short supraciliary edges; supraciliary and postocular of equally small size. Five upper labials; the third and fourth enter the orbit, the fifth the largest. Temporals 1+2. Mental shield and the anterior lower labials nearly entirely suppressed by a pair of very large chin-shields; these are followed by another pair of small scale-like chin-shields, behind which is the first abdominal scute, which again is much enlarged. Ventrals 129-131; anal single; subcaudals 17-27. Uniform blackish above and below, with an indistinct buff collar.

Three specimens from Travancore in Col. Beddome's collection; the largest is only  $7\frac{1}{2}$  inches long, the tail measuring  $\frac{1}{2}$  inch.

This species agrees with *Platypteryx perrotteti* (D. & B.) in having the same number of rows of scales; but the pterygoid bones are scarcely more dilated than in *G. microcephalus*.

#### SIMOTES SPLENDIDUS. (Plate XXXIII.)

Scales in twenty-one rows. Each of the anterior frontals is broken up into two shields; so that there are four small shields in the same transverse row. Loreal distinct; two præoculars, the lower of which is much smaller than the upper; two or three postoculars; eight upper labials, the fourth and fifth of which form the lower part of the orbit; temporals irregular. Ventral shields 195; anal entire; subcaudals 42. Yellowish white, with sixteen large bluish grey spots on the back; each of these spots is of an oblong shape, indented in front and behind, with a black edge and surrounded with a bright yellow margin; each scale within the spot with a black speck. The scales of the interspaces of the white ground-colour are irregularly speckled with blackish. A yellow line along the median line of the tail. The first spot on the neck is nearly entirely longitudinally divided by a yellow line, and is lance-shaped in front, the point of the lance resting on the vertical shield. The remainder of the head speckled with black. Lower parts white, with an irregular series of small squarish black spots along each abdominal edge.

A single example from the Wynad is in Col. Beddome's collection; it is 20 inches long, the tail measuring  $2\frac{1}{3}$  inches.

#### ABLABES ALBIVENTER.

Scales in fifteen rows. Two pairs of frontals. Loreal elongate; one præ- and two postoculars. Temporals 1+1; the occipital does not extend downwards to the lower postocular. Six upper labials, the third and fourth entering the orbit. Two pairs of chin-shields, the anterior being nearly twice the size of the posterior, and in contact with four labials. Ventrals 125; anal double; subcaudals 31. Brownish above; two or three narrow blackish lines along the outer series of scales; an indistinct light collar. Lower parts yellowish white.

Four examples from Darjeeling are in Dr. Jerdon's collection; the largest is 8 inches long, the tail measuring  $1\frac{1}{2}$  inch.

**TROPIDONOTUS MODESTUS.**

Scales in nineteen series, rather feebly keeled. Head narrow, though distinct from neck; eye of moderate size. Anterior frontals not pointed in front. Loreal nearly square; one præ- and three postoculars. Nine upper labials, the fourth, fifth and sixth entering the orbit. Temporals 1+1+2, the anterior in contact with the middle postocular. Maxillary teeth slightly increasing in size behind, and the last not separated from the preceding by an interspace. Ventrals 164-166; anal double; subcaudals 102. Dusky brownish ash-coloured above, with very indistinct small spots of a lighter or darker colour; the dark colour of the upper parts extends more or less over the scutes of the lower parts.

Two specimens from the Himalayas, presented by the late Dr. Jerdon; the largest is 19 inches long, the tail measuring  $4\frac{1}{2}$  inches.

**ACONTIOPHIS.**

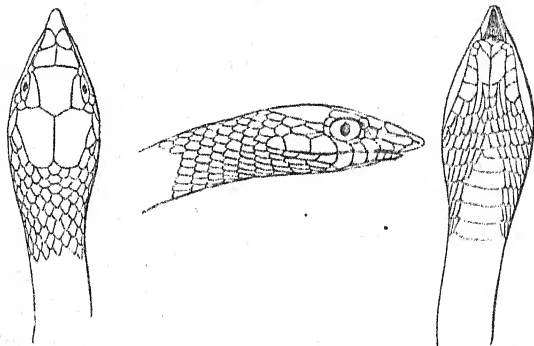
The position of the nostril of this snake is so peculiar, that it must be regarded as the type of a distinct family, *Acontiophidæ*, the place of which is near to the *Colubridæ*.

Snout acutely pointed, terminating in a rostral shield which has the shape of a four-sided pyramid, is deeply grooved below, and provided on each side with a longitudinal slit, the nostril, as in *Acontias*. The posterior maxillary tooth is longest, not grooved. Subcaudals two-rowed. Scales smooth, in nineteen rows.

**ACONTIOPHIS PARADOXA.**

The shields on the upper surface of the head are normal; the vertical being very broad, with concave lateral margins and an obtuse

Fig. 5.



Magnified 2 diameters.

posterior angle. The shield which is the homologue of the nasal in other snakes is elongate, smooth, not perforated, and distinct from the loreal. Three præ- and two postoculars. Eight upper labials,



the fifth only entering the orbit. Ventrals 187; subcaudals 44. Pupil vertical. Whitish, with a vertebral series of large subquadangular square spots; a dark-brown horizontal stripe behind the eye; and a spot of the same colour below the eye. Lower parts whitish.

A single specimen, 12 inches long (tail  $1\frac{1}{2}$  inch), is in the late Dr. Jerdon's collection. It is rather shrivelled; and unfortunately no record as regards the locality where it was found was placed on the bottle. He obtained it probably within the Himalayan region or in Khassya.

#### DIPSAS NUCHALIS.

Allied to *D. gokool*, but with a widely different coloration. Scales in twenty-one series, those of the vertebral series much enlarged, subhexagonal. Ventrals 233-242; anal single; subcaudals 90. Eye of moderate size. Loreal square; one præocular, just reaching the upper surface of the head; two postoculars. Eight upper labials, the third, fourth, and fifth of which enter the orbit. Temporals 2+3+3; a small odd temporal is intercalated between the anterior temporals and the postoculars. Upper parts light purplish brown, with a vertebral series of brown transverse spots which gradually become indistinct towards the middle of the length of the body, and further on disappear entirely. The first spot on the neck is a narrow transverse bar. An oblique narrow black temple-streak. Upper parts of the head nearly uniform brown. Lower parts yellowish, densely powdered with purplish brown.

Several specimens were found by Col. Beddome in the forests on the western coast of Malabar; the largest is 44 inches long, the tail measuring 10 inches.

#### OPHITES SEPTENTRIONALIS.

Scales in seventeen rows, only those in the middle of the back feebly keeled. Ventrals 214; anal single; subcaudals 83. Anterior frontals short, much broader than long; vertical five-sided, rather longer than broad. Nostril wide, situated between the two nasals, the anterior frontal, and the first labial. Loreal narrow, much longer than deep. One præocular just reaching the upper surface of the head; two postoculars; eight upper labials, the third, fourth, and fifth entering the orbit. Temporals 2+3. Black, trunk with thirty narrow white rings, only about two scales wide; the first at some distance behind the head. Lower parts white; subcaudals marbled with black.

One specimen from the late Dr. Jerdon's collection, without indication of its habitat. But there is no doubt that he obtained it during his last journey through the northern parts of India. It is 83 inches long, the tail measuring 8 inches.

#### TRIMERESURUS JERDONII. (Plate XXXIV.)

The second upper labial shield forms the front part of the facial pit; one or more small shields between the supranasals. Scales on

the upperside of the head very small, almost granular, those of the body keeled, in twenty-one series. One or two longitudinal rows of scales above, and nearly as large as, the posterior labials. Supraciliary not divided. Ventrals 164–172; subcaudals 42–60. Upper parts greenish brown, with a vertebral series of irregular subrhombic black markings and another series of vertical black spots along the side of the body. Upperside of the head with symmetrical black spots, and an oblique black band from the eye to the angle of the mouth. Lower side yellowish, posteriorly marbled with blackish.

Three specimens of this beautiful Snake were found by the late Dr. Jerdon in Khassya; the largest is 28 inches long, the tail measuring  $4\frac{1}{2}$  inches. The species is allied to *T. anamallensis*, but distinguished by the scutellation of the temporal region and the coloration of the upper part of the head.

4. On Venezuelan Birds collected by Mr. A. Goering. Part V.† By P. L. SCLATER, M.A., Ph.D., F.R.S., and OSBERT SALVIN, M.A., F.R.S.

[Received March 12, 1875.]

(Plate XXXV.)

Previously to his return to Europe last year, Mr. Goering made a second journey to the Sierra Nevada of Merida, and collected a certain number of birds, which he has kindly given us the opportunity of examining. Most of them belong to species inserted in our list of Mr. Goering's former collection from Merida; but there are some additional species, of which the names are now recorded, in order to make our knowledge of this interesting avifauna as complete as possible. These are as follows:—

*List of additional Species from Merida.*

1. *Turdus gigas*, Fraser ..... Merida.
2. *Myiadestes ralloides* (Lafr. et d'Orb.) Merida.
3. *Thryothorus coraya* (Gm.)..... Merida.
4. *Basileuterus coronatus* (Tsch.) ..... Merida.
5. — *luteoviridis*, Bp..... Merida.
6. *Vireosylva calidris* (Linn.) ..... Merida.
7. *Dica vassori* (Boiss.) .. Merida.
- \*8. *Chlorospingus chrysophrys*, sp. nov. Merida.
9. *Buarremon brunneinucha* (Lafr.) ... Upper wood-region of Merida.
10. — *assimilis* (Boiss.)..... Merida.
- \*11. — *castaneifrons*, sp. nov. .... Merida.
12. *Spermophila*, sp. inc. (♀)..... Merida.
13. *Chrysomitris columbiana* (Lafr.) ... Merida.
14. *Myiotheretes striaticollis*, Sel..... Merida.
15. *Ochthoeca stictoptera*, Sel. .... Merida.
16. *Tyranniscus nigricapillus* (Lafr.) ... Merida.
17. — *chrysops*, Sel. .... Merida.
18. *Myiarchus nigriceps*, Sel. .... Merida.

† See Part IV., P. Z. S. 1870, p. 779.

19. *Pachyrhamphus albogriseus*, Scl. ... Merida.
20. *Dendroornis erythropygia*, Scl. .... Merida.
21. *Dysithamnus semicinctus*, Scl. .... Merida.
22. *Grallaria squamigera*, Prevost ..... Sierra Nevada de Merida.
23. *Scytalopus griseicollis* (Lafr.) ..... Merida.
24. *Lampornis violicauda* (Bodd.) ..... Merida.
25. *Doryphora ludovicæ* (Bourc.) ..... Sierra Nevada de Merida.
26. *Acestrura heliodori* (Bourc.) ..... Merida.
27. *Chaetocercus rosæ* (Bourc. et Muls.) ..... Sierra Nevada de Merida.
28. *Steganura underwoodi* (Less.) ..... Merida.
29. *Lesbia gouldi* (Bourc.) ..... Sierra Nevada de Merida.
30. *Cyananthus cyanurus* (Steph.) ..... Merida.
31. *Adelomyia melanogenys* (Fraser) ... Sierra Nevada de Merida.
32. *Docimastes ensifer* (Boiss.) ..... Merida.
33. *Helianthea eos* (Gray and Mitch.) ... Merida.
34. *Eriocnemis cupreiventris* (Fras.) ... Merida.
35. *Campephilus malherbii*, Gray ..... Merida.
- \*36. *Aulacorhamphus calohynchus*, Gould Merida.
37. *Pionus seniloides* (Mass. et Souanc.) Merida.
38. *Glaucidium phalaenoides*, Daud. ... Merida.
39. *Asturina leucorrhœa* (Quoy et Gaim.) Merida.
- \*40. *Querquedula andium*, Scl. et Salv.... Sierra Nevada, alt. 10,000 ft.
41. *Columba albilineata*, Gray ..... Merida.
42. *Stegnotrema montagnii*, Bp. .... Merida.

We have a few remarks to offer upon some of these species, and upon some of those in the previous collection, of which additional examples are now sent.

#### 8. *CHLOROSPINGUS CHRYSOPHRYS*, sp. nov.

*Chlorospingus xanthophrys*, Scl. et Salv. P. Z. S. 1870, p. 780 (nec Scl.).

*Supra olivaceus, alis caudaque fuscis olivaceo limbatis, superciliis et corpore subtus flavis: rostro et pedibus fusco-cinereis: long. tota 5·5, alæ 2·75, caudæ 2·3.*

*Hab.* Merida (Goering).

*Obs.* Similis *C. superciliari*, sed superciliis flavis distinctus.

Of this species Mr. Goering obtained three skins at Merida. The two now before us are marked "females;" but the sexes are probably alike in colour. The iris is noted as "brown."

The type of *Chlorospingus xanthophrys* of Sclater (P. Z. S. 1856, p. 30), founded on a single skin in Sclater's collection, does not belong to this species, but is the same as *Basileuterus luteoviridis*. We have therefore changed its specific name to *chrysophrys*.

#### 11. *BUARREMON CASTANEIFRONS*, sp. nov. (Plate XXXV. fig. 1.)

*Buarremon schistaceus*, Scl. et Salv. P. Z. S. 1870, p. 780 (nec Boiss.).

*Supra nigricanti-schistaceus, pileo usque ad frontem clare castaneo: alis caudaque nigris, speculo alari nullo: subtus dilutior, gutture albo: capitis lateribus et striga utrinque gulari angusta nigris: rostro nigro, pedibus clare brunneis, iride brunnea: long. tota 6·5, alæ 2·8, caudæ 3.*

*Hab.* Upper wood-region of the Paramo de la Culata, Merida (Goering).

*Obs.* Assimilis *B. schistaceo*, sed pileo clarius castaneo in frontem producto, loris non albis et speculo alari nullo distinguendus.

Mr. Goering sends two additional examples of this species, which in our previous paper we did not distinguish from *B. schistaceus* of Columbia and Ecuador. It appears, however, to be fairly separable.

In Peru, again, we find another representative species of this section of the *Buarremones*, the *B. mystacalis* of Taczanowski (P. Z. S. 1874, p. 515). In this form there is likewise no white speculum on the wing; but the white lores are very distinct, and the chestnut cap is lighter than even in *B. castaneiceps*. Unfortunately the term *mystacalis* has already been used for a nearly allied species of *Buarremon*†, so that we propose to alter the name of the Peruvian form to *B. taczanowskii*. Of this bird a figure (Plate XXXV. fig. 2) is also given, for comparison with the allied Venezuelan species.

\*36. *AULACORHAMPHUS CALORHYNCHUS*, Gould, Ann. N. H. ser. 4, vol. xiv. p. 183 (1874).

Mr. Gould's description of this bird was based on examples obtained at Merida by Mr. Goering during his late expedition. We agree with Mr. Gould in regarding this as a new species allied to *A. sulcatus*, but easily distinguishable by the yellow upper mandible. Judging from our specimens of *A. sulcatus*, however, it is not larger, but rather smaller than that species.

Besides *A. calorhynchus*, Mr. Goering obtained, on his second journey, a single specimen of an *Aulacorhamphus* which Mr. Gould (*l. s. c.* p. 184) has referred to his newly described *A. phaeolæmus*. After examining this specimen (in Mr. Gould's collection), also a more adult example of the same bird obtained by Mr. Goering on his first expedition to Merida, and now in Salvin and Godman's collection‡, and comparing it with several "Bogota" skins (true *A. albivitta*) and skins obtained by Mr. Salmon in the province of Antioquia (types of Mr. Gould's *A. phaeolæmus*), we have come to the conclusion that *A. phaeolæmus* is not, in our opinion, fairly separable from *A. albivitta*. In one of Mr. Salmon's skins (in Mus. S.-G.), and in the adult skin obtained by Mr. Goering on his first expedition, the throat is quite as white as in ordinary "Bogota" skins of *A. albivitta*.

We may add that Mr. Goering's specimen of *Aulacorhamphus*, obtained at Caripé, which was determined by us (P. Z. S. 1868, p. 169) as *A. sulcatus*, is Mr. Gould's *A. erythrognathus* (*l. s. c.* p. 184), but that Mr. Goering has also sent home the true *A. sulcatus* from S. Esteban (*cf.* P. Z. S. 1868, p. 629). The distinction between these two nearly allied forms, though slight, appears to be valid.

† *Arremon mystacalis*, Sclater, Rev. et Mag. de Zool. 1852, p. 8, = *Buarremon albifrenatus* (Boiss.).

‡ See P. Z. S. 1870, p. 782.

## 40. QUERQUEDULA ANDIUM.

*Querquedula andium*, Scl. et Salv. Nomencl. p. 129 et p. 162.

This species was founded on Fraser's specimen, obtained in the Andes of Ecuador. Mr. Salvin has also two skins from another collection made in the same country.

Mr. Goering's example from the Sierra Nevada of Merida, at an altitude of 10,000 feet, agrees in every respect. The most salient characters of this Duck are its black bill and generally darker plumage.

After leaving Merida, on his last journey, Mr. Goering traversed the line of the Andes to San Cristoval, in the province of Tachira, on the frontiers of Columbia, where he obtained examples of the following thirty-three species:—

1. *Microcerculus squamulatus*, Scl. et Salv.
2. *Dacnis cayana* (Linn.).
3. *Calliste nigriviridis* (Lafr.).
4. — *cyaneicollis* (Lafr. et d'Orb.).
5. — *guttata* (Cab.).
6. *Phænicothraupis*, sp. inc., ♀.
7. *Saltator magnus* (Gm.).
8. *Cissopis minor* (Tsch.).
9. *Orchesticus ater* (Gm.).
10. *Phonipara pusilla* (Sw.).
11. *Emberizoides macrurus* (Gm.).
12. *Fluvicola pica* (Bodd.).
13. *Myiodynastes chrysocephalus* (Tsch.).
14. — *audax* (Gm.).
15. *Pipra leucocilla* (Linn.).
- \*16. *Rupicola peruviana* (Lath.).
17. *Dendrocolaptes validus* (Tsch.).
18. *Hypocnemis leucophrys* (Tsch.).
19. *Chamæza olivacea* (Tsch.).
20. *Phaethornis guyi* (Less.).
21. *Sternoclyta cyaneipectus* (Gould).
22. *Thalurania columbica* (Bourc. et Muls.).
23. *Nyctibius grandis* (Gm.).
24. *Antrostomus rufus* (Gm.).
25. *Nyctidromus albicollis* (Gm.).
26. *Chloronerpes rubiginosus* (Sw.).
- \*27. — *xanthochlorus*, sp. nov.
28. *Melanerpes cruentatus* (Bodd.).
29. *Ceryle amazona* (Lath.).
30. *Malacoptila mystacalis* (Lafr.).
31. *Coccyzus americanus* (Linn.).
- \*32. *Caica pyralia* (Bp.).
33. *Milvago chimachima* (Vieill.).

We have remarks to make on the following species:—

16. *RUPICOLA PERUVIANA* (Vieill.).

San Cristoval is the most eastern locality yet noted for the Peruvian Cock-of-the-Rock, which extends hence throughout the chain of the Andes into Bolivia. (See our remarks on the distribution of *Rupicola*, Ex. Orn. p. 29.)

27. *CHLORONERPES XANTHOCHLORUS*, sp. nov.

Fem. *Supra olivaceus, pileo toto cum nucha et linea utrinque a rictu ad cervicem ducta brunnescenti-flavis: capitis lateribus fuscis: subtus brunnescenti-flavus, nisi in gula crebre fusco transfasciatus: remigum marginibus internis clare rufis immaculatis; horum apicibus nigricantibus: cauda olivacea, rectricum apicibus nigricantibus: rostro et pedibus nigris: long. tota 8, alæ 5, caudæ 2·9, rostri a rictu 1·1.*

*Hab.* San Cristoval, prov. Tachira, Venezuela (Goering).

*Obs.* Similis feminae *C. chrysochlori*, sed pileo aureo diversus.

Of this *Chloronerpes* Mr. Goering obtained a single example at San Cristoval. It appears to be the female of the species, nearly related to *C. chrysochlorus* of Brazil, of which there is a female in Selater's collection. From this Mr. Goering's bird is conspicuously different, in that the head and nape are of a bright brownish yellow, instead of being olive like the back, as is the case in *C. chrysochlorus*. The male of *C. xanthochlorus* will, no doubt, have more or less red on the head, as is the case in the allied species.

32. *CAICA PYRILIA*, Bp.

A single specimen of this beautiful Parrot was obtained by Mr. Goering at San Cristoval, and is now in Salvin and Godman's collection. See our note on this species in Mr. Wyatt's article on the Birds of Columbia (*Ibis*, 1871, p. 381).

5. Descriptions of new Species of *Sphingidæ*.

By ARTHUR G. BUTLER, F.L.S., F.Z.S., &c.

[Received March 4, 1875.]

(Plates XXXVI. & XXXVII.)

In consequence of the numerous new species discovered in Mr. Moore's rich collection of Eastern *Sphingidæ*, it has been proposed that I should relieve my memoir on this subject by forming a separate paper of the descriptions of them for the 'Proceedings.' I have, however, left one or two new forms in the original paper, either because the descriptions were very short and the species unimportant, or because I considered it advisable to have certain characters before the eye of the student when examining into the species which I have separated in a genus.

The characters of the subfamilies and of most of the new genera are retained in the above-mentioned revision: descriptions of larvæ are also, for the most part, left in that paper.

## Subfamily MACROGLOSSINÆ.

## Genus SATASPES, Moore.

## 1. SATASPES XYLOCOPARIS, n. sp. (Plate XXXVI. fig. 1.)

Primaries semitransparent smoky brown, basal half crossed by three black bands, the innermost near the base three times as broad as the others, the outermost diffused, oblique, crossing the wing at the end of the cell; base grey; secondaries with apical area to first median branch semitransparent brown; anal-abdominal area opaque, black-brown; nervures blackish; costa silvery white; head, palpi, and antennæ above dull black; thorax bright golden yellow, collar blackish behind; abdomen black; the third, fourth, fifth, and sixth segments clothed with yellow hairs, with yellow-tipped black lateral tufts; anal tuft black; wings below somewhat lilacine, black-brown at base, veins black; palpi below slate-coloured; thorax dark brown, yellow at base of wings; abdomen black, segments slate-coloured at the margins. Expanse of wings 2 inches 11 lines.

Shanghai, China.

Type, coll. F. Moore.

This handsome species is allied to *S. uniformis* and *S. ventralis*. The species of *Sataspes* appear to mimic *Xylocopa æstuaus* and *X. flavonigrescens*.

## Genus HEMARIS, Dalman.

## 2. HEMARIS MANDARINA, n. sp. (Plate XXXVI. fig. 2.)

Nearly allied to *H. sieboldi* (*whitelyi*, Butl.), but differs in the coloration of the secondaries (which is like that of *H. radians*), the basal and abdominal areas above being ochreous, the costa pale yellow; primaries below with basal half of costa ochreous; inner margin pale yellow, ochreous in front; secondaries with costa, base, and abdominal area ochreous; palpi and pectus pale testaceous. Expanse of wings 2 inches 1 line.

Shanghai, China.

Type, coll. F. Moore.

This species bears much the same relation to *H. radians* that *H. sieboldi* does to *H. alternata*, the dark brown border of primaries being strongly denticulated in *H. radians* and *H. alternata*, but entire in *H. sieboldi* and *H. mandarina*.

## Genus RHOPALOPSYCHE, n. gen.

Allied to *Macroglossa*, but at once distinguished by the distinctly clubbed antennæ, resembling those of a Hesperidian butterfly: the wings are also somewhat shorter and the terminal joint of palpi more prominent.

Type, *R. nycteris* of Kollar.

## 3. RHOPALOPSYCHE BIFASCIATA, n. sp. (Plate XXXVI. fig. 4.)

Primaries with basal two thirds and outer margin brownish cinereous, disk red-brown; two parallel central transverse dark brown bands: secondaries orange-yellow; outer margin, except at anal angle, rather broadly dark brown: body brownish grey; metathorax,

tips of pterygodes, and base of abdomen clothed with red-brown hairs; three basal segments orange-yellow at the sides; subterminal segment edged behind with an interrupted white fringe; anal black, greyish at the tip; lateral tufts brown, tipped with whitish: wings below reddish, ferruginous yellow at base, with brown border to outer margin; secondaries with abdominal area broadly yellow; two or three indistinct ferruginous transverse lines; palpi white; pectus whitish; abdomen and base of anal tuft rosy brown; lateral tufts brown, with white tips. Expanse of wings 1 inch 7 lines.

South India (*Ward*).

Type, coll. F. Moore.

Genus *MACROGLOSSA*, Ochsenheim.

4. *MACROGLOSSA AFFICTITIA*, n. sp. (Plate XXXVI. fig. 7.)

Nearly allied to *M. gyrans* and *M. belis*; from the former it differs above in having the outer borders of secondaries better defined, the orange band consequently less diffused and not so red in tint; the white fringe to the last segment but one less pure in colour; the wings below with all the transverse brown lines strongly marked, as in *M. belis*, brownish testaceous in colour; discoidal cell of primaries clothed with golden yellow hairs; abdominal area of secondaries orange; palpi below white, pectus whity brown, abdomen brownish testaceous: from *M. belis* it differs above in the duller orange band of secondaries, and in having the lateral orange spots on the abdomen united (as in *M. gyrans*), and the last segment but one bordered with sordid white; below it differs in the altogether browner tint of the wings. Expanse of wings 2 inches.

Canara.

Type, coll. F. Moore.

We have what I believe to be a small variety of this species in the British Museum; it is, however, much darker, and is said to come from North India.

5. *MACROGLOSSA VIALIS*, n. sp. (Plate XXXVI. fig. 5.)

Nearly allied to *M. gyrans*; but the primaries above with the transverse lines much more distinct, and the central area between the second and third lines whitish brown, forming a distinct sub-central white band: secondaries with the outer margin broadly and distinctly bordered with brown; sides of body reddish, the lateral abdominal tufts yellowish; transverse lines on underside of wings more distinct. Expanse of wings 1 inch 7 lines.

Canara.

Type, coll. F. Moore.

This species seems to stand in the same relation to *M. gyrans* as *M. sitiene* does to *M. belis*.

6. *MACROGLOSSA AVICULA*, Boisd.

Wings above dark pitchy brown, primaries with a lilacine tint, crossed by two transverse central blackish bars; a bifid subapical quadrate spot; secondaries with the costa testaceous: head, thorax, and three basal segments olive-green, the latter marked at the sides by quadrate orange spots; the fourth and fifth segments pitchy, in-



interrupted in the middle by a cruciform paler brown marking; the fifth segment bordered behind by ochreous scales; terminal segments red-brown, blackish in the middle; anal tuft black at base, red-brown at tip; lateral tufts black at base, tawny at tips: wings below chocolate brown, transversely crossed by indistinct nebulous brown bars, base bright yellow; primaries with inner margin testaceous; palpi and thorax below creamy: abdomen red-brown; basal segments with a central longitudinal yellow patch; lateral tufts black, tipped with ochreous; anal tuft as above. Expanse of wings 1 inch 9 lines.

Java (*Argent*).

Type, B.M.

Nearly allied to *M. bombylans*, but differing in several important points.

7. *MACROGLOSSA GLAUOPTERA*, n. sp. (Plate XXXVI. fig. 9.)

Primaries above shining dark slaty grey, base very dark; two dark brown transverse subparallel bands, edged with black; two waved parallel discal lines from external angle to costa: secondaries with the costa silky stramineous, basal half orange, interrupted at base by two diverging black dashes, outer margin to near middle of wing dark brown: body dull tawny; abdomen with ferruginous lateral and central spots, also whitish-tipped ferruginous lateral tufts; anal tuft black, pale rosy brown at the tip: wings below deep ferruginous, base and abdominal area of secondaries golden yellow; outer margin brownish, two or three indistinct transverse brown lines: palpi below missing, probably white; pectus sordid whitish, reddish laterally; abdomen ferruginous, lateral tufts brown, tipped with pale ochreous; anal tuft red-brown. Expanse of wings 2 inches.

Ceylon (*T. Skinner*).

One bad example, coll. F. Moore.

8. *MACROGLOSSA NIGRIFASCIATA*, n. sp. (Plate XXXVII. fig. 3.)

Primaries above greyish brown, somewhat slaty towards base; a black transverse subbasal band, beginning very broad on inner margin and narrowing to costal nervure; an angulated and curved black-edged olivaceous discal band; outer margin from costa to external angle olive-brown; a blackish subapical spot: secondaries orange, costa stramineous, base with two diverging black dashes; outer margin broadly black-brown: body olivaceous, three basal segments with lateral orange spots, terminal segments with lateral white-tipped black tufts; anal tuft rosy-brown: wings below dull ferruginous, becoming smoky brown on outer margin, yellow at base; secondaries with a large pyriform abdominal golden-yellow patch; disk crossed by two or three brown lines; palpi missing; pectus and centre of venter whity-brown, remainder of abdomen black-brown. Expanse of wings 2 inches 1 line.

Ceylon.

One bad example, coll. F. Moore.

9. *MACROGLOSSA LUTEATA*, n. sp. (Plate XXXVII. fig. 5.)

Nearly allied to *M. proxima*: primaries dark brown, becoming lilacine in the centre, crossed near base by a dark oblique band, and

beyond the middle by two parallel slightly waved lines : secondaries dark brown, with a central ochreous band ; costa testaceous : body dark brownish grey ; anal tuft dark brown, tipped with reddish ; three basal segments with small lateral ochreous spots : wings below rather brighter than in *M. proxima*, body paler, otherwise the same. Expanse of wings 2 inches 7 lines.

Silhet.

Type, coll. F. Moore.

Only one rather damaged example ; it may at once be distinguished from *M. proxima* by the more distinct and paler band of secondaries.

10. *MACROGLOSSA INTERRUPTA*, n. sp. (Plate XXXVII. fig. 2.)

Nearly allied to the preceding ; palpi shorter : primaries brown, a blackish subbasal marking, united below, trifasciate above ; a very indistinct angulated band from costa just beyond cell to external angle ; outer margin with a zigzag olive-brown border from apex to second median branch ; a subapical black lunule, touching the border : secondaries with the costa and base pale brown ; two diverging basal black streaks, outer margin very broadly black-brown, anal angle very narrowly bordered with brown ; a central orange-yellow transverse band, interrupted below first median branch ; an oval basicostal orange-yellow spot : body red-brown ; abdomen transversely banded with black, three basal segments with lateral oval yellow spots : wings and body below as in *M. belis*. Expanse of wings 2 inches 1 line.

Darjeeling.

Type, coll. F. Moore.

11. *MACROGLOSSA PYRRHOSTICTA*, n. sp. (Plate XXXVI. fig. 8.)

Wings above almost exactly like *M. corythus* ; abdomen greyer, the subterminal segment edged with an interrupted white fringe : primaries below red-brown, yellow at base, inner margin whitish, disco-submarginal area red ; outer margin smoky brown : secondaries tawny, abdominal area and base golden yellow ; outer margin and centre of costa brown ; three irregular red-brown transverse lines : palpi below white ; pectus whitish, pale rosy brown at the sides : abdomen brown, with a central and lateral series of large red spots ; second and third segments with a small lateral white dot. Expanse of wings 2 inches 3 lines.

Shanghai, China.

Type, coll. F. Moore.

This beautiful species may at once be distinguished from all its allies, excepting the little *M. insipida*, by the peculiar coloration of the under surface. The larva is stone-colour whitish-speckled, the anterior segments greenish, the horn, two lines on each side of the dorsal region, and six or seven oblique lines between the spiracles (which are black) green. It feeds on a beautiful but unpleasant-smelling creeping plant with waxy crimson-and-white flowers ; Mr. Lewis found it upon this plant in company with the larva of *M. gilia*.

12. *MACROGLOSSA INSIPIDA*, n. sp.

Like a small form of *M. catapyrrha*, but the secondaries above

with a broader orange band and, consequently, a narrower marginal brown border, primaries not varied with tawny; below like *M. pyrrhosticta*, but the secondaries rather redder. Expanse of wings 1 inch 6 lines.

Ceylon (*Skinner*).

Type, coll. F. Moore.

13. *MACROGLOSSA CATAPYRRHA*, n. sp. (Plate XXXVI. fig. 6.)

Nearly allied to *M. fraterna*; primaries purplish slate-colour, crossed by brown lines as in that species, *M. belis*, and *M. corythus*, but with the subapical dark spot less distinct, and the bands (formed by double lines) more or less tawny; secondaries exactly as in *M. fraterna*: body purplish slate-colour; pterygodes, collar, and sides of abdomen ferruginous; three lateral quadrate orange spots and dorsal double series of blackish spots as in *M. fraterna*; subterminal segment edged with white behind: wings below ferruginous, yellow at base, with terminal irregular brown border; usual brown transverse lines; palpi and coxæ whitish; sides of thorax and abdomen bright ferruginous, the second and third segments with a white lateral dot; lateral tufts tipped with ochreous. Expanse of wings 1 inch 11 lines.

N. India (coll. F. Moore); Ceylon (*Templeton*).

B.M.

14. *MACROGLOSSA HEMICHROMA*, n. sp. (Plate XXXVII. fig. 1.)

Allied to *M. fero*, but the basal half of primaries grey sharply defined and paler externally; the apical half olive-brown, darkest internally, outer margin sprinkled with paler scales: secondaries as in *M. fero*, dark brown with a central orange band; costa testaceous: head and thorax reddish brown, with a dark dorsal line: abdomen dark brown, the three basal segments with yellow spots; lateral tufts dark brown, tipped with white; anal tuft dark brown, paler at the tip: wings below reddish brown, outer margin with a darker border; secondaries with a large pyriform orange-yellow abdominal patch, four or five transverse dark brown lines; body below grey, palpi and prothorax sordid white. Expanse of wings 2 inch 8 lines.

Silhet.

Type, coll. F. Moore.

Only one example, not in very good condition.

15. *MACROGLOSSA IMPERATOR*, n. sp. (Plate XXXVII. fig. 4.)

Primaries above dark brown, almost black, with the base and basal two thirds of costa dark grey; outer margin paler grey; a large costal subapical patch, a disco-submarginal irregular streak (near external angle and extending to lower radial nervure), and a transverse straight central band whitish brown; secondaries black-brown, with a broad central irregular orange band, costa testaceous; head grey, with a central piceous streak; thorax piceous, with two parallel longitudinal grey bands, reddish posteriorly; abdomen glossy grey, with lateral series of quadrate black spots; second and third segments with small lateral orange spots; lateral tufts black-brown, tipped with white; anal tuft black-brown (incomplete):

primaries below dull ferruginous, yellow at base and smoky along costa; a submarginal irregular ochraceous band, diffused in the centre internally, intersected and partially bounded by brown lines; outer margin brown: secondaries dull pale tawny, becoming golden yellow on abdominal area; costa and base greyish; disk crossed by two lunulated discal parallel lines; outer margin unequally bordered with brown: palpi white; pectus reddish grey; abdomen grey, irrorated with tawny scales. Expanse of wings 2 inches 7 lines.

Ceylon (*T. Skinner*).

Type, coll. F. Moore.

This magnificent species approaches *M. mitchellii* of Boisduval.

#### Genus *LOPHURA*, Walker.

##### 16. *LOPHURA MASURIENSIS*, n. sp. (Plate XXXVI. fig. 3.)

♂ ♀. Primaries above pale rose-brown, varied with greyish lilacine; two black dots near the base, four indistinct oblique sub-angulated transverse brown lines; a central subolivaceous oblique band, intersected by two opposed bisinuated black lines and interrupted at end of cell by a triangular olivaceous patch, bounded on one side by the costa, enclosing a discocellular pitchy spot crossed by a pale brown streak, and limited just below third median branch by a black litura; disk hatched and clouded with olive-brown, a short bimacular whitish litura running obliquely inwards from excavation of inner margin; an irregular sinuated brown disco-submarginal line, terminating upon costa in a brown lunate spot; costa from the latter to base brown-spotted; outer margin irregularly red-brown, edged internally with black towards apex and bounded by a lilacine nebula: secondaries with basal half orange, apical half dark pitchy brown; costa whitish, varied with blackish: body rose-brown, head with a central V-shaped brown marking; thorax streaked with olivaceous or reddish brown: abdomen rather cinereous in the centre, tawny at the sides, with the segments pink-edged and fringed with dark brown, two lateral series of oblique red-brown dots, the inner series interrupted above the fourth segment; anal tuft cinereous in the centre, black-brown at the sides: primaries below dark brown, base yellowish; an interrupted tawny spot at end of cell; the disk near costa and inner margin tawny ochraceous, varied with whitish and hatched with dark brown; outer margin shining slate-colour, inner margin dotted with whitish: secondaries tawny ochraceous, whitish on abdominal area, hatched and dotted with red-brown, costa grey-spotted; outer margin dark cinereous, black-edged internally; body below pinkish grey at the sides, reddish ochraceous in the centre; abdomen with a double ventral series of triangular white points; lateral tufts brown. Expanse of wings 1 inch 9 lines.

♂ ♀ Masuri, N.W. Himalayas.

Type, coll. F. Moore.

##### 17. *LOPHURA PUSILLA*, n. sp.

Primaries above grey, with pink reflections; a white-edged sub-basal nebulous brown spot; a central oblique olive-brown band fading away at first median branch, and on each side of it a brown litura; a subtriangular brown patch at end of cell, interrupted by

the whitish discocellulars; two wavy brown-edged whitish lines; a reddish streak near external angle, and a black spot on inner margin; a brownish oblique nebula from outer margin near the angle to costa; outer margin partially but narrowly edged with dark brown: secondaries ochreous, outer margin broadly ferruginous, dotted with brown scales; inner margin edged with blackish: body greyish brown; abdomen reddish at the sides: wings below reddish ochreous, irrorated with brown; costa greyish, a whitish spot at end of each cell; primaries with inner margin grey, outer margin broadly brown; secondaries with abdominal area yellowish, two central transverse brown lines: body below grey, sprinkled with ferruginous scales. Expanse of wings 1 inch  $2\frac{1}{2}$  lines.

Silhet.

Type, coll. F. Moore.

### Subfamily CHÆROCAMPINÆ.

#### Genus ACOSMERYX, Boisduval.

General appearance of the *Mimas* group of the *Smerinthinæ* (*Polyptychus*): body more robust; male with a short anal tuft; palpi much larger; wings shorter and broader; primaries with outer margin subangulated in the middle and generally undulated; discocellulars below obscured by long scales: secondaries much broader, costal margin more convex, inner margin longer; outer margin more or less undulated: larva of the *Chærocampa* type.

The larva of *A. anceus* is figured in Moore and Horsfield's Catalogue, pl. ix. fig. 4. I have also seen a figure sent by S. N. Ward (from Canara) to Mr. Moore, which appears to be either a variety of the same larva or a distinct but nearly allied species; the moth not being so well figured as the larva, I cannot be certain; it is possible that it may be *A. sericeus*: the anal horn of the larva is long, dark, and curved.

#### 18. ACOSMERYX CINEREA, n. sp.

Allied to *A. sericea*, but both sexes generally coloured as in *A. anceus* ♀, silvery grey tinted with brown; primaries crossed by six or seven oblique pale brown lines, and from costa to external angle by a brown bar; outer margin brown, bordered internally by a nebulous silvery streak; secondaries crossed beyond the middle by a pale brown bar, apex and outer margin pale brown, bounded internally by a reddish tint: body brownish grey; antennæ testaceous: wings below very similar to *M. sericea*, but altogether paler, very slightly tinted with reddish; secondaries crossed by four indistinct brown lines in pairs, apex grey: body below pale reddish brown. Expanse of wings 3 inches 7 lines.

Silhet (*Argent*).

Type, B.M.

We have three example of this species; it may at once be distinguished from *A. sericea* (irrespective of coloration) by the less-produced primaries, with scarcely undulated outer margin. Mr. Moore has a pair from Silhet and N.E. Bengal, which have the primaries coloured like *A. sericea*.

## Genus PERGESA, Walker.

## 19. PERGESA ÆGROTA, n. sp.

Allied to *P. castor*, but altogether paler : primaries testaceous ; two angulated bars across basal area, two or three indistinct spots in cell, an interrupted waved discal bar, a disco-subapical diffused spot, a litura running from costa to upper radial nervure, and a zigzag submarginal line, brown ; a number of brown hatchings all over the wing, especially at outer margin : secondaries black-brown, costa pale shining testaceous ; a broad disco-submarginal, slightly waved, dark testaceous band : body testaceous ; thorax duller than abdomen, the latter with a double central longitudinal series of blackish dots, three basal segments with a lateral brown line : wings below stramineous ; markings nearly as in *P. eastor*, brown ; body creamy stramineous. Expanse of wings 3 inches 1 line.

Silhet.

Type, coll. F. Moore.

## 20. PERGESA GLORIOSA, n. sp.

Somewhat resembles the *C. elenor* group of *Chærocampa* : primaries red-brown ; the base, an irregular broad band across end of cell, increasing in width from internal nervure to costa, a narrow lunulated transverse discal line, the apical part of costal area, and a broad tapering irregular submarginal band bronzy olivaceous, dotted with whitish at the edges upon the nervures ; an interrupted pearly lilacine marginal line ; fringe ochreous ; a blackish spot on lower discocellular nervure ; secondaries dull olive-brown ; a broad rosy discal band, slightly tapering at both ends ; outer margin reddish ; fringe ochreous, white at anal angle : body olivaceous, rosy at the sides : wings below bright rose-red, crossed by three continuous parallel greyish discal lines ; primaries with costa ochreous, basal two fifths (excepting a subcostal dash extending into cell) dull brown, fringe ochreous ; secondaries with basal area creamy whitish, fringe as above ; body bright rose-red, legs cream-coloured. Expanse of wings 3 inches 6 lines.

Darjeeling.

Type, coll. F. Moore.

## Genus PANACRA, Walker.

## 21. PANACRA ELLA, n. sp.

Nearly allied to *P. testacea*, same general pattern and coloration above ; it differs as follows :—primaries more golden, with the transverse brown lines less distinct, postmedian transverse lilacine streak diffused and broader, a large quadrate area from external angle to end of cell suffused with brown ; secondaries darker brown, pale discal streak less prominent and not so red in tint ; body above duller : wings below altogether more dusky, disk redder, outer margin of all the wings distinctly dull brown ; transverse lines of secondaries better-defined ; body yellower in the centre and more greyish at the sides. Expanse of wings 2 inches 5 lines.

Silhet.

Type, coll. F. Moore.

Possibly an extreme variety of *P. testacea*, but I think not.

22. *PANACRA REGULARIS*, n. sp.

Intermediate in character between *P. metallica* and *P. vigil*; differs from both in the perfectly regular oblique outer margin of primaries: wings above brown; primaries olivaceous, with the disk whitish from inner margin to centre of wing; basicostal area speckled with black, especially towards costa; base of costal area dark brown, remainder of costa pale, rather yellow at the edge; six oblique curved parallel discal dark brown lines, the three innermost filled in with smoky brown, radial nervures and external area between them dark; apex with a zigzag silvery white oblique litura; three apical submarginal blackish spots upon the nervures: secondaries pale smoky brown, costa whitish, abdominal area pale; anal angle whitish, margin and a submarginal streak dark brown: body almost as in *P. automedon*, but paler: primaries below dull brown, costa and external third greyish varied with pale buff and freckled with black; a discal series of black points: secondaries brownish grey mottled with dark brown and buff, a discal waved series of blackish points. Expanse of wings 2 inches 4 lines.

Java.

Type, coll. F. Moore.

A very distinct and interesting species.

Genus *CHÆROCAMPA*, Duponchel.23. *CHÆROCAMPA LEWISII*, n. sp.

Very like *C. elpenor*, but duller above, the rosy streaks on primaries less evident, primaries below with the golden discal patch not extending (except as a fine line) below lower radial. Expanse of wings 2 inches, 10 lines.

Japan (*Lewis*).

Larva very distinct from *C. elpenor*, brown or green. The brown larva differs principally in having the lower surface and lateral area of the last seven segments brown, with a defined undate-sinuate internal edge, each sinuosity answering to the convex margin of its segment; the two eye-like spots are much smaller and have pale brownish centres in both forms of the larva; the horn in the green form is longer but less curved than in the brown form. It feeds on Fuchsia and Balsam.

Without having seen the excellent figures of the transformations obtained by Mr. Lewis, I should not for a moment have thought this species distinct from *C. elpenor*.

24. *CHÆROCAMPA FRATERNA*, n. sp.

General aspect of *C. macromera*, but duller: primaries above golden olivaceous, with the two oblique bands and border dull greyish pink; secondaries with basal half dull black, external half dull pink, fringe whitish; body altogether duller: wings below bright rose-red, costæ ochreous, a central grey-brown transverse line; basal half of primaries brown, clothed to first median branch with ochreous and pink hairs: body below rose-red, abdomen with lateral white dots. Expanse of wings 3 inches 2 lines.

Simla (coll. F. Moore); N. India.

B.M.

The central transverse grey line below and the dull coloration above at once distinguish this species.

25. *CHÆROCAMPA MIRABILIS*, n. sp.

Primaries above pale dull greyish green, crossed by two distinct irregular blackish lines, the first angulated, crossing centre of cell, the second also angulated but in the opposite direction, with a deep central sinuation; base dusky, crossed by an indistinct whitish litura; a black discocellular dot; disk beyond cell dark green, inner margin pale rose-colour, outer margin slightly tinted with pink: secondaries grey-brown, costa whitish brown, basal area and submarginal streak smoky brown, anal angle pale pink: body olive-green, margins of head and thorax and apical two fifths of pterygodes rosy cream-coloured; back of collar whitish: wings below rose-colour, with an irregular continuous central brown line; outer margin broadly brown; primaries with basal half pale brown: body below creamy; thorax tinted with pink, brownish at the sides; abdomen rosy at the sides. Expanse of wings 3 inches 3 lines.

N.W. Himalayas.

Type, coll. F. Moore.

A marvellous new species, allied to *C. fraterna*.

26. *CHÆROCAMPA ROSINA*, n. sp. (Plate XXXVII. fig. 6.)

Primaries nearly as in the figure of *C. lycetus*, silvery brown, rosy at the margins, with brown bands and lines as in *C. argentata* and *C. oldenlandiæ*, but the second from outer margin broader; the paler oblique postmedian streak running to apex scarcely less brown than the ground-colour; a ferruginous costal line; subcostal area, especially beyond the cell, tawny: secondaries dark brown, the costa and abdominal area testaceous, a dull rosy disco-submarginal streak from inner margin to subcostal nervure; outer margin greyish, with a rosy tint; fringe white, varied with dull rose-colour: body almost exactly as in *C. argentata*, but the central streak duller and more rosy and the lateral streaks more metallic: wings below very like *C. oldenlandiæ*, but much redder, with a broader rosy lilacine outer border, and the innermost transverse streak broader and darker. Expanse of wings 2 inches 8 lines.

Masuri, N.W. Himalayas (*Hutton*).

Type, coll. F. Moore.

In my opinion this is more like *C. lycetus* than is *C. oldenlandiæ*. The British Museum has recently received this species from Darjeeling.

27. *CHÆROCAMPA PUNCTIVENATA*, n. sp.

Closely allied to *C. clotho*, larger, primaries broader, the outermost transverse discal line dotted with black upon the nervures, and further from the outer margin; secondaries, body, and under surface as in pale examples of *C. clotho*. Expanse of wings 4 inches.

Masuri, N. W. Himalayas (*Hutton*), Silhet.

Type, coll. F. Moore.

The dotting of the nervures gives this species a very distinct as-



pect: there is an example of this species in the British Museum, without a locality, presented by Mr. Doubleday.

28. *CHÆROCAMPA BISTRIGATA*, n. sp.

Closely allied *C. clotho*; differs in the narrower primaries, blacker and narrower secondaries, with more pinky pale anal area, and the abdomen not black-specked, but with two pale parallel central longitudinal lines: underside as in pale examples of *C. clotho*. Expanse of wings 3 inches 8 lines.

Java (*Horsfield*).

Colls. F. Moore and B.M.

29. *CHÆROCAMPA GONOGRAPTA*, n. sp.

Allied to *C. clotho*: primaries varying from dove-colour to pale greenish, external area dotted with blackish scales, densely at apex; a nebulous darkish spot beyond cell; a black interno-basal tuft; the outermost oblique line of *C. clotho* indicated and dotted upon the nervures with blackish, but differing from that line in all the allied species in running nearly parallel to the outer margin as far as the subcostal fork, whence it is only continued very obliquely to apex in the form of the blackish apical scales mentioned above; innermost line sometimes present, but ill-defined; a black dot on lower discocellular nervure: secondaries with the whole outer margin broadly bordered with pinky whitish: body and underside as in very pale examples of *C. clotho*.

Bombay and S. India.

Type, coll. F. Moore.

30. *CHÆROCAMPA MINOR*, n. sp.

Nearly allied to *C. lineosa*, but having the general aspect of the *C. clotho* group: it differs from *C. lineosa* in its smaller size, delicate buff coloration, with less strongly defined oblique lines on primaries; the secondaries brown instead of black, with the discal band diffused, and the outer margin very pale brown; the body more uniform, marked with slightly paler but not whitish streaks; wings below creamy ochreous, mottled with flesh-colour, with the usual brown markings ill-defined. Expanse of wings 3 inches 6 lines.

Massuri (*Hutton*).

Type, coll. Moore.

I have no hesitation whatever in placing this as a well marked and distinct species between the *C. clotho* and *C. lineosa* groups.

31. *CHÆROCAMPA MAJOR*, n. sp.

Nearly allied to *C. lineosa*, but larger, the dark oblique band of primaries and the pale discal band of secondaries much broader, and the other markings better defined; a well-defined central thoracic pale streak; wings below generally redder; the oblique lines better defined and more continuous. Expanse of wings 4 inches 5 lines.

Darjeeling (*coll. Moore*); Silhet.

B.M.

I have very little doubt that this is a distinct species; it has a totally different aspect to *C. lineosa*, although agreeing with it in the arrangement of its markings.

## Subfamily AMBULICINÆ, Butler.

## Genus AMBULYX, Walker.

## 32. AMBULYX LITURATA, n. sp.

♂. Primaries above pale reddish brown; a short dark brown litura crossing the costal area near base, thence running for about half an inch along costal margin, thence obliquely across the end of cell to origin of third median branch; two parallel lunulated lines running transversely across the wing from third fourth of median nervure to inner margin, the outer line darker than the inner; a small black rounded interno-median spot near the base; three transverse irregularly undulated discal lines, darkest towards costa and inner margin, the innermost one best defined and widely separated from the two others; the space between the first and second line and the area next to external area darker than the ground-colour; a costal apical dusky patch, margined internally and crossed externally by oblique olive-brown streaks; a yellow-edged dark brown submarginal line, tapering from the middle to both extremities; marginal enclosed area slightly darker than the ground-colour; extreme edge and fringe rosy brown; the usual veins darkened: secondaries golden yellow towards costa and apex, mottled with red-brown, becoming ferruginous, clothed with whitish hair scales to submedian nervure; abdominal area whitish brown; a concave central transverse blackish bar, tapering to abdominal angle, a lunulated discal line from near costa to near anal angle, and beneath it, upon first median branch, a black dot; outer margin red-brown; fringe rosy brown: thorax rosy whitish, crest crossed transversely by a dark olive-brown bar; pterygodes and metathorax streaked with a dark red-brown bar; abdomen whitish brown, segments white at the margins and edged with ferruginous; a blood-red dorsal line: wings below golden yellow, tawny externally and mottled with greyish brown; two or three interrupted greyish brown transverse streaks; outer margin of primaries greyish, with a dark inner edge; abdominal area of secondaries testaceous: body orange; venter rosy whitish in the centre; legs partly testaceous; palpi brilliant tawny. Expanse of wings 4 inches 5 lines.

—?

♂ ♀, type, coll. F. Moore.

The larva of this species is extremely beautiful; it is bright sap-green with the underparts bluish green, the spiracles even paler, almost white, the prolegs reddish; a narrow white stripe gradually widening from behind the head to the front of third segment, and thence to the tail; a series of eight elliptical crimson-edged white spots crossing the segments, and continued obliquely downwards between the spiracles in the form of ill-defined oblique yellowish stripes, the last spot also continued upwards by a whitish stripe running to the base of the anal horn, which is yellowish green; an indistinct oblique yellowish stripe from outer angle of anal claspers. Length 3 inches  $1\frac{1}{2}$  line; length of anal horn  $3\frac{1}{2}$  lines.

Both larva and pupa are of nearly the Smerinthine type, proving

that the genus has been wrongly located amongst the *Chærocampinæ*; it is, in fact, somewhat allied to *Basiana*.

A note, on the original drawing representing the three stages of this species, states that it "feeds on *Amoora Rohituka*."

The female of *A. liturata* is larger and darker than the male; the primaries are redder and more uniform in colour, the outer marginal area alone being distinguished by deeper coloration; the body is also darker, with the dorsal line of the abdomen dark brown.

### 33. *AMBULYX RHODOPTERA*, n. sp.

♂. Allied to the preceding; primaries with the markings similar but less distinct, outer marginal area darker, the entire wing with the exception of the marginal area rosy; secondaries rather paler than in *A. liturata*, the mottlings less distinct, the inner transverse bar reduced to a line: body rosy, with the usual dark mahogany-brown thoracic bands; dorsal abdominal line brown: wings and body below rather lighter than in *A. liturata*. Expanse of wings 4 inches 1 line.

Darjeeling.

Type, coll. F. Moore.

A very pretty and distinct species.

### 34. *AMBULYX SERICEIPENNIS*, n. sp.

Primaries silky, of the male whitey brown, of the female pinkish grey; a rounded spot at base, a second at basal sixth of costa, and in the male a third on interno-median interspace near the base, all dark olive-brown, encircled with whitish; two very irregular parallel brown lines crossing the wing before the end of the cell; a black dot on lower discocellular veinlet; a broad grey-margined lunulated discal olivaceous band from costa to inner margin, where it becomes tinted with slate-colour; a very indistinct lunulated grey line beyond it; the apical patch olivaceous, margined internally and crossed obliquely near apex by diffused dusky streaks; outer margin broadly olivaceous, margined internally by a dusky line, within which is a pale yellow halo: secondaries much as in the preceding species, paler in the male, darker with blackish transverse lines in the female: body of male whitey brown, of the female pinkish grey with the usual bands dark olive-brown; wings below much paler, ochraceous, sparsely mottled with grey; primaries with whitish marginal border. Expanse of wings, ♂ 3 inches 9 lines, ♀ 4 inches 8 lines.

Massuri, N.W. Himalayas (*Hutton*).

Type, coll. F. Moore.

A very pretty species.

### 35. *AMBULYX LAHORA*, n. sp.

Primaries above rosy brownish, base slightly clouded with grey; a large olivaceous spot with a whitish margin at basal fifth of costa; a similar oblique oval interno-median spot near the base; two irregular parallel transverse lines, crossing the third fourth of cell; a broad slightly waved continuous discal olive-brown band; a lunulated line just beyond it and confounded with it towards inner margin; an oblique diffused subapical brown litura; outer margin with a broad

olive-brown border, tapering at each end; fringe ferruginous: secondaries dull brick-red, the costal area and base testaceous, abdominal area reddish testaceous, anal area suffused with whitish; a central transverse straight grey streak from inner margin to end of cell; an abbreviated discal grey line, and a brownish anal submarginal litura: body above brownish, with usual dark markings; face whitish: wings below pale ferruginous, disk of primaries browner in tint; two ill-defined discal continuous ferruginous lines; primaries with inner margin silky, testaceous or bronzy; outer margin with a broad tapering whitish border: secondaries with basal and abdominal areas somewhat whitish: thorax below and base of abdomen deep ferruginous; remaining segments of abdomen greyish. Expanse of wings 4 inches 2 lines.

N.W. Himalayas.

Type, coll. F. Moore.

Allied to the preceding, but entirely distinct.

### 36. *AMBULYX TURBATA*, n. sp.

Primaries above rich castaneous; a broad central greyish band, margined on both sides by indistinct zigzag brown lines from sub-costal nervure above end of cell to inner margin; a greenish grey spot on lower discocellular; disk clouded with blackish; outer margin with broad coffee-brown border, tapering at apex, but not at external angle, margined internally, excepting towards apex, by an orange line edged within with whitish and bounded by four semi-circular olivaceous spots, margined towards apex by a dusky-edged pearly line: secondaries almost as in *A. liturata*: body red-brown; head greyish, with red-brown crest: wings below much like *A. sericeipennis*, but redder and darker: body bright ochraceous, varied with reddish; palpi and prothorax reddish orange. Expanse of wings 4 inches 7 lines.

Darjeeling.

Type, coll. F. Moore.

*Var.* Smaller, brighter in colour; primaries with two central and two discal transverse zigzag lines, all distinct; submarginal semicircular spots less marked, blending at their bases into an undulated fascia; secondaries much brighter in colour, with the transverse lines much blacker; wings below transversely mottled with distinct grey spots. Expanse of wings 4 inches 1 line.

Canara, S. India.

Coll. F. Moore.

The most beautiful species in the genus, with the exception of *A. rubricosu*; it is allied to *A. sericeipennis*.

## Subfamily SMERINTHINÆ.

### Genus BASIANA, Walker.

### 37. *BASIANA EXUSTA*, n. sp.

Allied to *B. deucalion*: primaries rosy greyish, basal area pale slaty grey, covered at base by testaceous tufts; three parallel dark grey zigzag lines across the middle of the cell from costa to inner margin; two dusky-edged parallel zigzag discal olivaceous bars from costa to inner margin; apex blackish, between it and outer band

a greyish patch; outer margin red-brown; a black dot on lower discocellular, enclosed in a pale testaceous streak, which runs from within cell, just above the third median branch to outer discal bar: secondaries rosy brick-colour, costa testaceous, anal angle grey; two pale postmedian brown streaks from anal angle to discoidal nervure, outer margin and an abbreviated lunulated discal streak dark brown, bordered within with pale rosy: thorax chocolate-brown, testaceous at the sides; abdomen whity brown: wings below rosy, crossed by two parallel discal brown lines, outer margin dark brown; primaries with an oblique line from apex to lower discoidal nervure, subapical area lilacine, base and inner margin testaceous: thorax below deep foxy red, especially the palpi and prothorax; abdomen deep rose-red. Expanse of wings 3 inches 7 lines.

Kunawur, N.W. Himalayas (*Lang*).

Type, coll. F. Moore.

This is a very pretty little species; the larva, according to Capt. Lang, feeds on poplar.

#### Genus TRIPTOGON, Bremer,

Bull. de l'Acad. Imp. St. Pétersb. iii. (1861).

Allied to *Metamimas*; primaries not angulated below apex; all the wings regularly undulated from apex to external angle; under surface of discoidal area of primaries densely scaled so as to obscure the discocellulars; upper discocellular of secondaries rather longer than lower, convex, lower oblique; palpi short, obtuse; antennæ long, of male strongly pectinated.

Type *T. dissimilis*, Bremer.

#### 38. TRIPTOGON GIGAS, n. sp.

Allied to *T. sperchius*, rather larger; primaries above paler, excepting at centre of outer margin; a blackish discocellular spot; four transverse basal lines well defined: secondaries red-brown (as in *T. dyras*); anal angle paler, with two obliquely placed small brown spots: primaries below with central transverse lines less distinct; secondaries whity brown, excepting at anal angle (which is tawny) three nearly equidistant red-brown lines. Expanse of wings 5 inches 5 lines.

♂ ♀, Silhet (*Stainsforth*).

Type, B.M.

#### 39. TRIPTOGON CRISTATA, n. sp.

Wings and body above dull clay-brown, clouded with slaty grey; primaries crossed by seven dark brown lines, the third and fourth (but especially the latter) well defined, oblique, and nearly straight; the lines arranged much as in *T. gigas*, but the third and fourth nearer together; the spot near external angle olive-brown, not well defined; a pale spot on lower discocellular vein: secondaries nearly uniform in colour, but rather darker towards apex, browner on abdominal area, and very slightly paler at anal angle, where there is also an olive-brown spot: body with a well-marked dark central longitudinal crest from the front of the head to near the end of abdomen; antennæ whity brown: wings below brighter-coloured than

above; primaries olive-brown, reddish towards base, with the costa and veins rosy clay-colour, two dark brown undulated parallel discal lines from costa to near inner margin; secondaries rosy clay-colour, crossed by three almost equidistant dark brown lines, the outermost one subangulated in the middle: body below rosy clay-colour; palpi, tibiæ, tarsi, and anal valves dusky. Expanse of wings 4 inches 9 lines.

Vicinity of Darjeeling.

Type, coll. W. B. Farr.

Allied to *T. gigas*, but altogether darker, redder, and much more uniform in colour; it differs from all its allies in the continuous crest from end to end of the body: it is a very distinct new species, not likely to be confounded with any member of the *T. dyras* group.

#### 40. TRIPTOGON ALBICANS, n. sp.

♂ ♀. Allied to *T. gigas*, but smaller, altogether paler, the body and primaries whitish; the latter without the nebulous brown suffusion from outer margin to end of cell; the central lines closely approximating at inner margin; the discal spot within the wavy line small and less distinct: secondaries whitish, with a central brick-red diffused band from inner margin to near apex, leaving a subquadrate whitish patch at anal angle; anal spots brown, less distinct: wings and body below almost white. The male with a slight tawny diffused patch near external angle of primaries and anal angle of secondaries; the female with a faint reddish-brown suffusion in cell of primaries: male with two elbowed continuous discal brownish lines and a third straight line across cell of secondaries; female with two additional parallel abbreviated lines just beyond cell of primaries, and an additional line just beyond cell of secondaries. Body whitish. Expanse of wings, ♂ 4 inches 4 lines, ♀ 5 inches 1 line.

Massuri, N.W. Himalayas (*Hutton*).

Type, coll. F. Moore.

#### 41. TRIPTOGON SINENSIS, n. sp.

♀. Very like *T. dyras*; primaries less strongly excavated below external angle, more pointed at apex, outer margin less strongly undulated, transverse lines less distinct, sixth line (beyond cell) straighter, eighth line more broadly waved, enclosed spot obsolete, apical darker area narrower and longer: secondaries paler, scarcely undulated; anal angle less grey, with only one black spot: wings below altogether paler, transverse lines less strongly waved. Expanse of wings 4 inches 5 lines.

Hong-Kong (*Harrington*).

Type, B.M.

This is a local modification of *T. dyras*; but it is evidently quite distinct from *T. sperchius*, which with *T. gigas*, *T. dissimilis*, and others, forms a little distinct section of the genus characterized by long produced primaries.

#### 42. TRIPTOGON JAVANICA, n. sp.

Primaries above whitish brown, clouded with chocolate-brown nebulae, crossed by transverse lines arranged almost as in *T. dyras*, but all strongly defined; the wavy line more contracted above the black

spot, which is smaller; secondaries brick-red, dusky towards base; costa testaceous; a whitish nebula at anal angle enclosing the two usual dark brown spots: wings below coloured as in *T. sinensis*, but slightly darker, the transverse lines also very similar, but better defined and rather wider apart in the primaries: expanse of wings, ♂ 3 inches 3 lines, ♀ 4 inches 5 lines.

Java (*Horsfield*).

♂ ♀, B.M.; ♀, coll. F. Moore.

Easily distinguished from *T. dyras* by its superior size and very much deeper colouring, also in the much more strongly defined transverse lines on the upperside of primaries and on the underside of all the wings.

#### 43. TRIPTOGON CEYLANICA.

♂ *Smerinthus dyras* (part.), Walker (descr.), Lep. Het. viii. p. 250. n. 13 (1856).

Larger and broader than the preceding, the primaries olivaceous darker on both surfaces; the transverse lines less woolly, more sharply defined; the eighth line with a well-rounded curve; the spot larger: secondaries chestnut-red, abdominal area dusky in the centre, anal whitish patch as usual, black spots large: wings below more dusky than in the preceding species, with the transverse lines almost black; the discal lines in primaries continued to inner margin, and the post-cellular lines to below third median branch; inner lines in secondaries much straighter, outer discal lines more waved: the body (as well as the wings) altogether browner in tint. Expanse of wings 3 inches 8 lines.

♂, Ceylon (*Templeton*).

Type, B.M.

#### 44. TRIPTOGON SILHETENSIS, n. sp.

*Smerinthus dyras* (sic), Boisduval, MS. (part. Walker).

Nearly allied to the preceding, rather lighter, not quite so broad, the outer margin more strongly undulated, the apex more produced, the inner margin more excavated near external angle; the transverse lines finer, not quite so defined, less angular; the blackish spots similar; wings below altogether paler; chocolate apical marginal patch more restricted, subapical area whitish; outer central line of secondaries almost obsolete; outer discal lines much more angular. Expanse of wings, ♂ 4 inches, ♀ 4 inches 5 lines.

♂ ♀, Silhet (coll. F. Moore); ♀, Silhet (*Stainsforth*). B.M.

This species was placed with *T. dyras* by Mr. Walker; and it is on one of our examples of this species that I found Dr. Boisduval's MS. label; it is, however, evident (from the measurement given) that Mr. Walker did not make it the type of his description.

#### 45. TRIPTOGON ORIENS, n. sp.

♂. Primaries same form as *T. silhetensis*, whitish brown, clouded with greyish brown, transverse lines unusually straight, the wavy line very indistinct, apical margin broadly dusky; secondaries nearly as in preceding species, rather paler; body greyer than in any of the preceding species: wings below as pale as in *S. dyras*, but the

apical marginal red-brown patch of primaries restricted to apex; apical third of wing dusky, whitish at costa; discal lines on all the wings very indistinct; central lines well marked. Expanse of wings 4 inches.

N.E. India.

Type, coll. F. Moore.

In this species and the male of the preceding the most noticeable thing at first sight is the strongly marked blackish patch above the whitish anal nebula of secondaries; in this species, owing to the paler colouring of all the wings, this character is more evident than in *T. silhetensis*.

46. *TRIPTOGON MASSURENSIS*, n. sp.

Primaries of male paler than in any other species, of female similar in colour to *T. silhetensis*; apex very acute; fifth obtuse denticle of outer margin more prominent, and the wavy line with a wider curve than in any other species; black spot small; apex dusky: secondaries dull reddish, as in *T. javanica*: underside of male as in *T. dyras*, but with the transverse lines more defined, the apical red-brown patch of primaries strongly marked, and the sub-apical area whitish; the underside of the female almost as in *T. silhetensis*, but more dusky, the apical patch more restricted, the costal area of primaries duller, the central lines of secondaries straighter. Expanse of wings ♂ 3 inches 8 lines, ♀ 4 inches 3 lines.

Massuri, N.W. Himalayas (*Hutton*).

Type, coll. F. Moore.

Nearly allied to the preceding.

47. *TRIPTOGON FUSCESCENS*, n. sp.

♂ ♀. Altogether browner than any of the preceding species; the apical and basal areas of primaries more dusky; all the transverse lines dark brown, well defined; the discocellulars dark: secondaries duller than usual; the interno-median dark patch less conspicuous; the anal spots large in the male, small in the female: wings below brownish testaceous, all the transverse lines very strongly defined; the male with the apex of primaries and the apical area (excepting at costa) greyish brown, the nervures crossing it and the external angle tawny; the costa sordid white: secondaries rosy-tinted, with the external area beyond the discal lines uniformly tawny, slightly dusky at apex: the female below (as above) is very similar to that sex of *T. massurensis*, but paler, less reddish and more greyish. Expanse of wings ♂ 3 inches 8 lines, ♀ 4 inches 5 lines.

Darjeeling.

Type, coll. F. Moore.

This and the six preceding it are doubtless all local representatives of *T. dyras* of Walker.

48. *TRIPTOGON SPECTABILIS*, n. sp.

♂. Primaries lilacine grey, costal area red-brown, outer margin from costa to second median branch with a broad tapering chocolate-brown border bounded within by a pale pinky line; two very irregular brown-edged dark grey bands across basal half of wing, also several very indistinct brown lituræ; discocellulars brown, a



whitish dot on lower discocellular; external half of wing distinctly marked off by a narrow brown-edged dusky band, followed immediately by a brown bisinuated line; an irregularly undulated line and ocelloid patch (enclosing two large black spots) near external angle, as in *T. dyras* and allies: secondaries brown, darker towards centre of abdominal area, costal area testaceous, anal area grey; an ochraceous submarginal diffused litura at apex; the veins of costal half of wing tawny: thorax grey; abdomen pinkish brown, with clay-coloured diffused lateral patches on each segment, edges of the segments whitish, a dorsal ferruginous line: primaries below smoky brown, the base and internal area testaceous; apical half of costa creamy white; apical area greyish; crossed by pinkish veins, and transversely by a postcellular diffused subcostal spot and two parallel postcellular abbreviated lines, dark brown, also by two much more widely separated blackish lines, the inner one best-defined, angulated so that it joins the outer one in second median interspace; a sinuated orange spot at apex; external area below third median branch golden orange, clouded and irrorated with bright ferruginous: secondaries rosy, abdominal area grey; a submarginal anal streak of bright orange, bordered with brown externally; three central parallel slightly irregular brown lines and two more widely separated angulated discal lines; a whitish diffused subapical costal spot, and a line of the same colour margining the outer discal line; the areas between the lines somewhat dusky; body rosy clay-colour. Expanse of wings 3 inches 11 lines.

Darjeeling.

Type, coll. F. Moore.

A very beautiful species.

#### 49. *TRIPTOGON ROSEIPENNIS*, n. sp.

Allied to *T. gaschkwitschii*, but the primaries more pointed at apex and brownish ochreous, lilacine between the bands, the inner margin and apex slaty grey, outer margin from apex to first median branch black-brown, basal tuft rosy; secondaries rose-colour, becoming ochraceous at outer margin, two large black subanal spots (not bordered with white); body much darker, thorax purplish brown, with a broad deep chocolate-brown longitudinal central streak; abdomen brown, purplish at the sides: primaries below paler than above, interno-basal half (costa excepted) rosy, disk pale brown tinted with rosy, outer margin broadly coppery brown from costa to inner margin; secondaries pale brown, tinted with rosy, abdominal area broadly pink, outer margin broadly coppery brown; body purplish brown. Expanse of wings 3 inches 7 lines.

Hakodadi (*Whitely*).

Type, B.M.

The larva of this species is bright sap-green, covered with minute yellow tubercles, with seven long oblique lateral stripes of yellow from between the spiracles to the dorsal region; legs yellow, prolegs tipped with brown.

A second form of the larva is pale sea-green, with the posterior areas of the sixth to the eleventh segments in the dorsal region pale greyish pink; the tubercles and lateral stripes white; the legs pale green.

A third variety is golden yellow, with the tubercles and lateral stripes paler yellow; the segments, excepting the anterior ones, with lateral pectinated subtriangular crimson-lake patches, bounded internally by the lateral oblique lines, and a reddish diffused spot in front of the tubercles: this is the most beautiful variety.

Mr. Lewis found the species feeding upon plum and cherry.

#### Subfamily SPHINGINÆ.

#### Genus ISOGNATHUS, Felder.

##### 50. ISOGNATHUS FUMOSA, n. sp.

Dark brownish grey; primaries marked, much as in the preceding species, with brown lines and dots, a long oblique blackish streak beginning within cell and running into second median interspace; secondaries orange-yellow, with a broad chocolate-brown outer border (10 millimetres wide), deeply excavated on abdominal margin, and streaked with three whitish lituræ at anal angle: body brownish grey, thorax indistinctly varied with darker brown; abdomen fasciated with dark-brown bars, interrupted in the middle: below smoky brown, disk of wings crossed by a darker streak, blackish on the nervures; secondaries with the costal area greyish, a large subtriangular orange patch from abdominal margin to centre of discoidal cell and corresponding disk. Expanse of wings 3 inches 11 lines.

Brazil (*Stevens*).

Type, B.M.

Possibly the female of *Sphinx leachii*, but with a much wider black border to secondaries.

##### 51. ISOGNATHUS METASCYRON, n. sp.

Allied to *D. scyron*; pinkish brown above, irregularly clouded and spotted with black, the nervures on disk spotted with alternate black and clay-coloured strigulæ and dots, internal half of wing dusky; secondaries orange-yellow, with a rather broad black border (4 millimetres) to outer margin, not reaching abdominal margin: body uniformly pinkish brown; collar, a streak on pterygodes, a lateral abdominal series of bars, and two central longitudinal lines dark brown; wings below nearly as in preceding species, but the orange patch of secondaries much larger and crossed above middle of wing by blackish nervures. Expanse of wings 4 inches.

Villa Nova (*Bates*).

Type, B.M.

I found this species mixed up with *I. fasciata*. It seems chiefly to differ from *I. scyron* in its greater size and the much narrower black border of secondaries, and from *I. swainsonii* in the latter character.

#### Genus DILOPHONOTA, Burmeister.

##### 52. DILOPHONOTA DOMINGONIS, n. sp.

♂. Exceedingly like *D. obscura* ♂, but broader in wing; the primaries much whiter, with the streaks and spots showing dark upon them; the discocellular area quite white, enclosing a black dot; secondaries redder; thorax darker; abdomen rather greyer, central

pale streak divided by a median grey line; wings below paler, primaries redder and secondaries whiter at base; thorax below whitish. Expanse of wings 2 inches 7 lines.

♀. Altogether darker than *D. obscura* ♀; the patch on discocellulars, the apical patch, and the external border of primaries silvery grey, rendering the species much like a small example of *D. omphaleæ*; the secondaries, body, and under surface differ as in the ♂. Expanse of wings 2 inches 7 lines.

Haiti (*Tweedie*).

Type, B.M.

#### Genus PROTOPARCE, Burmeister.

##### 53. PROTOPARCE GRISEATA, n. sp.

Nearly allied to *P. carolina*, but the primaries, head, and thorax greenish, the transverse lines on primaries more oblique and irregular; secondaries whitish, crossed at base by a blackish bar, not reaching costa, a central irregular blackish bar, forking internally from submedian to subcostal nervure; a broad brown border to outer margin, blackish internally, whitish externally, and intersected towards anal angle by a whitish litura; thorax without a blackish collar or blackish margins to pterygodes; abdomen with six lateral decreasing more or less oval orange spots: primaries below somewhat like *P. carolina*, paler, only two transverse dusky discal bars, marginal area whitish; secondaries sordid white, costa and a submarginal band smoky brown; two central brown lines, widely diverging towards costa, the outer one strongly dentate; body below greyish brown. Expanse of wings 3 inches 8 lines.

Venezuela (*Dyson*).

Type, B.M.

#### Genus PSEUDOSPHEX, Burmeister.

##### 54. PSEUDOSPHEX CYRTOLOPHIA, n. sp.

Very close to *P. nyctiphanes*, much smaller, paler, and more ochraceous in tint, transverse pale band near base of primaries more regular, dark band beyond cell more incurved and less expanded at costa; apex paler, scarcely marked with darker spots; secondaries with the series of pale spots less yellow, much further from outer margin, whitish fringe less perceptible; wings below altogether paler, markings on primaries less distinct. Expanse of wings 3 inches 4 lines.

Madras.

Type, coll. F. Moore.

The larva of this species is pale pink, with oblique lateral diffused green stripes, margined below with white, and a dorsal white line. It has a conical hump on the neck; and the horn, especially in the young stages, is long and slightly tending to recurve at the tip.

#### Genus DOLBA, Walker.

##### 55. DOLBA HARTWEGII, n. sp.

*Dolba hylæus* (part), Walker, Lep. Het. viii. p. 230, specimens *f, g* (1856).

Primaries above smoky brown; a whitish brown subbasal undu-

lated bar, intersected by a brown undulated line, not reaching costa or inner margin; a broad grey-brown central fascia, margined and intersected by five lunulated ill-defined black lines; a white spot at end of cell; disco-submarginal area crossed by two confused zigzag black lines, and widening abruptly near apex: secondaries smoky brown, blackish at anal angle, pale at base, whitish on basicostal area; a pale brown waved discal streak, becoming white towards anal angle; a pale brown submarginal anal litura: head, prothorax, and tegulæ dark brown, remainder of thorax greyish; external margins of tegulæ blackish; abdomen grey-brown, with a row of lateral dark brown spots: wings below grey-brown, a pale dusky-edged bar from costa of primaries to anal angle of secondaries; head, thorax, and anus below brown; base of palpi and femora of legs and venter white. Expanse of wings 2 inches 5 lines.

Oaxaca, Mexico (*Hartweg*).

Type, B.M.

#### Genus DILUDIA, Grote.

##### 56. DILUDIA GRANDIS, n. sp.

Intermediate between *D. obliqua* and *D. discistriga*; most like the latter, but readily distinguished by the single broad black bar from costa to end of cell (enclosing a distinct white point on lower discocellular nervure), almost joining a single long distinct black streak on second median interspace; apical patch grey, broader than in any other species, widely encircled with black: secondaries rich brown, with costa and a subcostal patch at base silky testaceous; anal angle whitish, as in *D. obliqua*, crossed by four black bars, the two central ones well defined, running across the centre of the wing: body whitish grey; thorax with usual black streaks; abdomen with dorsal and lateral interrupted black streaks: wings below altogether whiter than *D. obliqua*, otherwise somewhat similar. Expanse of wings 5 inches 8 lines.

Nepal.

Type, coll. F. Moore.

##### 57. DILUDIA RUFESCENS, n. sp.

Allied to the preceding, but altogether redder in tint; the primaries much broader, irrorated all over with golden scales, a distinct oblique black bar from costa to end of cell, discocellular lunate whitish spot large and distinct, apical patch broader and more irregular than in any of the allied species; discal lunulated lines broadly separated, but less defined, not filled in with whitish: secondaries broader, blacker, with two central converging and a third discal black streaks: body much redder; lateral streak blacker; three or four lateral large creamy ochreous black-edged spots: underside much as usual. Expanse of wings 4 inches 9 lines.

North India.

Type, coll. F. Moore.

#### Genus HYLOICUS, Hübner.

##### 58. HYLOICUS ASIATICUS, n. sp.

Nearly allied to *H. pinastri*, larger, darker; outer margin of

primaries straighter, the spot in cell perpendicular, the median streaks longer, the central nebulous fascia less defined; body dark grey; pterygodes almost entirely chocolate-brown; abdomen with lateral black spots smaller, less defined; wings below paler; the transverse discal brown streak scarcely visible in primaries, and further from outer margin; ventral blackish spots larger. Expanse of wings 3 inches 7 lines.

"E. Indies. Probably from Scinde"! (*Warwick*). Type, B.M.

Notwithstanding the general similarity between this species and *H. pinastri*, I have no doubt that it is distinct. It is probable, from what we know of the metamorphoses of the *Sphingidæ*, that the larvæ of the two species are much less alike than the imagines.

#### 59. HYLOICUS UNIFORMIS, n. sp.

Allied to *H. asiaticus*, but altogether smaller, paler; the markings less defined, excepting two central waved transverse grey bands across primaries; the abdomen uniform whity brown, without lateral black and white spots; fringe whitish; wings and body below uniform sericeous whity brown. Expanse of wings 2 inches 1 line.

N.W. Himalayas.

Type, coll. F. Moore.

This is by far the smallest species in the genus. It may at once be distinguished from *H. pinastri* and allies by the uniform greyish or whity-brown colour of the abdomen.

### EXPLANATION OF THE PLATES.

#### PLATE XXXVI.

- Fig. 1. *Sataspes xylocoparis*, p. 239.  
 2. *Hemaris mandarina*, p. 239.  
 3. *Lophura masuriensis*, p. 244.  
 4. *Rhopalopsyche bifasciata*, p. 239.  
 5. *Macroglossa vialis*, p. 240.  
 6. — *catapyrrha*, p. 243.  
 7. — *afflictita*, p. 240.  
 8. — *pyrrhosticta*, p. 242.  
 9. — *glaucoptera*, p. 241.

#### PLATE XXXVII.

- Fig. 1. *Macroglossa hemichroma*, p. 243.  
 2. — *interrupta*, p. 242.  
 3. — *nigrifasciata*, p. 241.  
 4. — *imperator*, p. 243.  
 5. — *luteata*, p. 241.  
 6. *Charocampa rosina*, p. 248.

### 6. On a new Species of Deer from Mesopotamia.

By Sir VICTOR BROOKE, Bart., F.Z.S.

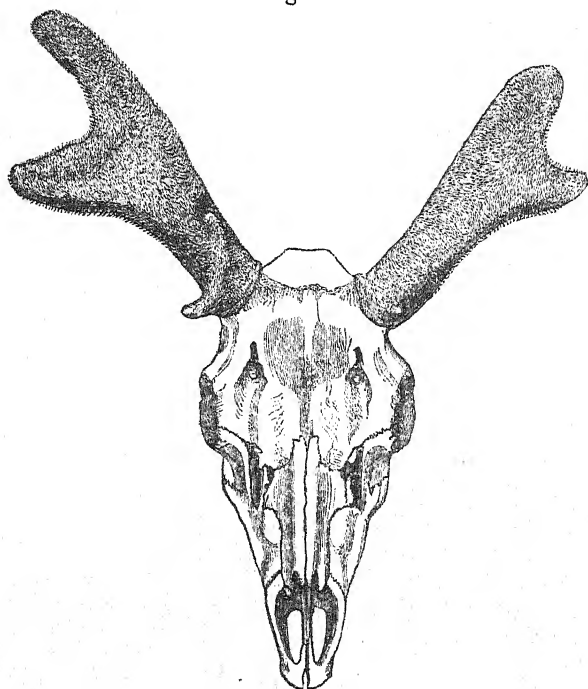
[Received March 16, 1875.]

(Plate XXXVIII.)

Upon his return from the Seistan Boundary Expedition, our Corresponding Member Mr. Blanford informed me that he had heard

rumours of the existence of a Spotted Deer in the countries immediately to the north of the Persian Gulf. He expressed at the same time his opinion that the matter was of considerable interest, and recommended me to take active steps to obtain specimens. This I at once did by writing to Capt. Jones, H.B.M. Consul at Tabreez, who was at the time most kindly endeavouring to procure for me specimens of all the Persian Cervidæ and Bovidæ. Upon the receipt of my letter, Capt. Jones put himself into immediate communication with Mr. Robertson, the English Vice-Consul at Busrah, requesting him, if possible, to obtain specimens of the Mesopotamian Spotted Deer. In his reply, Mr. Robertson wrote, "Please tell Sir Victor Brooke that I have already sent a skull with horns and a skin of the Spotted Deer to Mr. Selater, Secretary of the Zoological Society, with whom doubtless Sir Victor is well

Fig. 1.

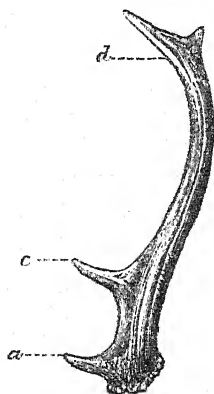
Head of *Cervus (Dama) mesopotamicus* ♂, with horns half-grown.

acquainted. I shall send Sir Victor the horns and skin of the next buck I shoot." Having observed my interest in the matter, my friend Mr. Selater, with characteristic generosity, handed these specimens over to me upon their arrival, and requested me to lay before the Society the results of my observations. At the first glance the

general conformation of the skull and the markings of the skin sent by Mr. Robertson so closely resembled those of the common Fallow Deer, that I was inclined to believe the Mesopotamian specimens to be referable to this species, the peculiarities in the horns, which were in velvet, and about half-grown (fig. 1), being attributable to abnormality. A closer examination, however, revealed characters which showed me that this first impression was incorrect, and convinced me that, though more closely allied to *Dama vulgaris* than to any other existing Deer, the specimens appertained to a new and very interesting species. Wishing, if possible, to avoid founding the species upon the examination of a single specimen, I considered it better to await the results of Mr. Robertson's indefatigable exertions to obtain more materials before introducing the species to the Society's notice.

A short time subsequently I received a letter from Mr. Robertson, in which he thus writes:—"I received your last letter when on the point of setting out for a few days' shooting on the Karoon, where I hoped to get a good head of the Spotted Deer, but have not succeeded. I only saw one specimen, a doe. At some distance I examined her through a field-glass, and observed that her colour was considerably darker and duller than that of the buck (shot in March), whose skin I sent to Mr. Sclater (Plate XXXVIII.). Her spots, however, were as marked as usual; and I am pretty sure that I have seen Spotted Deer on the Karoon at all seasons of the year. The other

Fig. 2.



Antler of *Cervus (Dama) mesopotamicus*, picked up near the Karoon.

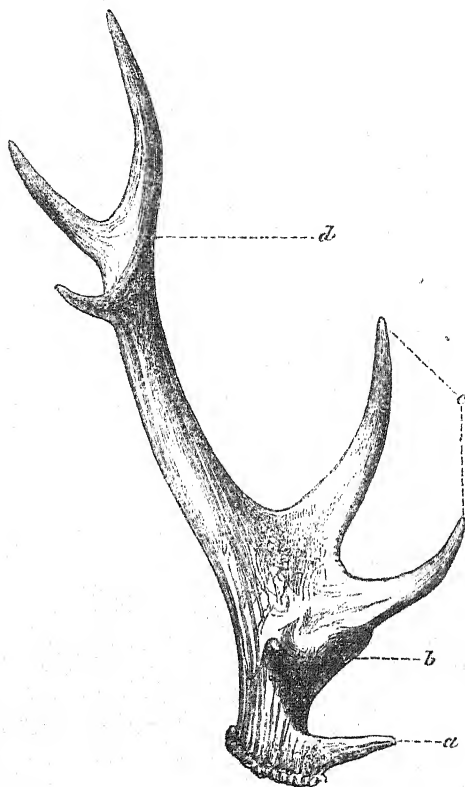
Deer which I mentioned as inhabiting the same jungles is rather smaller and always brown. I send you two cast horns, which I have marked 1 and 2 (see fig. 2, p. 263, and fig. 3, p. 264). The former was picked up near the Karoon, and is that, *I think*, of a brown Deer; the latter I got from a friend, who could only tell me that it came from Shuster. It is, I believe, a fully developed horn of a Spotted

Deer." These horns, both of which, I think, belong to the same species, decide the matter, and prove that, by his energetic assistance, Mr. Robertson has enabled me to bring to light one of the most interesting forms amongst existing Cervidæ. The following description will, I hope, with the assistance of Mr. Wolf's beautiful drawing, enable naturalists to recognize the species, which I propose to name

CERVUS (DAMA) MESOPOTAMICUS, sp. nov. (Plate XXXVIII.)

Hair of moderate length, stiff, and close-set. General colour of neck, body, and limbs bright fawn. Back of the neck, upper parts of the sides, and haunches spotted with white, the spots blending

Fig. 3.



Antler of *Cervus (Dama) mesopotamicus*, from Shuster.

together so as to form continuous lines along each side of the dorsal list, on the haunches, and along the sides of the body. Posterior part of the haunches and all four extremities uniform pale fawn-



colour. Some black hairs form an indefinite dark patch on the base and at each side of the base of the tail. Remainder of the tail and the belly white.

*Skull* broad in comparison with its length, and in general form resembling that of *Dama vulgaris*. Nasals expanded at the superior extremities. Suture between the malar and maxilla equidistant from the lower rim of the orbit and the alveoli of the molars. Præmaxillæ reaching the nasals.

Horns with a strong massive burr, immediately above which is developed a short brow-antler, rather compressed from above downwards (*a*, figs. 2, 3). Expanding gradually from the burrs a fan-shaped palm is formed, from which are thrown off one inner (fig. 3, *b*) and two anterior tines (fig. 3, *c*). From the posterior corner of the palm rises a strong cylindrical beam, terminating in three well-developed tines (figs. 2, 3, *d*).

Total length of the horn in a straight line 22"; height of the palm 7", its width 5"; length of the brow-antler 2"; height of adult male at the shoulder about 40".

*Hab.* Khuzistan, Luristan (Persia).

In reference to the habits of the species, Mr. Robertson has sent me the following particulars:—"I fear I cannot tell you much about the habits of these animals; there are very few of them on the Karoon. But I understand they are more plentiful on the Dis and Kerkhah, where the jungles are of greater extent and the feeding probably better. The Karoon jungles are of white poplar and tamarisk bushes. From March until November there is abundance of coarse grass, which horses will eat when hungry, but not otherwise. I once watched a doe and her fawn browsing on the young shoots of poplar bushes. These and a kind of moss found in depressions in the desert where rain-water has lain, are, I fancy, their food. Gazelles live chiefly on the latter. These deer are never seen abroad after sunrise. They pass the day in the thick poplar-jungle, which is scarcely penetrable, and where it is impossible to surprise them. Those I have shot I have generally found in the morning and evening twilight near the edge of the cover. If you will indicate any further points upon which information will be useful, I will do my best to obtain it."

#### *Comparison with Dama vulgaris.*

In its general cranial structure, palmated horns, and coloration *Dama mesopotamica* exhibits close affinity to *Dama vulgaris*, but may be easily distinguished from that species by the following characters:—

1. By its considerably superior size.
2. By the much greater lateral expansion of the superior extremities of the nasal bones.
3. By the position of the suture between the malar and superior maxilla. In the new species this suture is about equidistant from the lower border of the orbit and the alveoli of the molars; in the Fallow Deer it is situated much nearer the former.

4. By its aborted brow-antlers in the palmated portion of the horns lying inferior instead of superior to the cylindrical portion as in *Dama vulgaris*, and by the points being developed from the anterior instead of the posterior aspect of the horns as is the case in the common species.

5. By the spots on the upper parts of the back blending together so as to form two continuous white streaks, one on each side of the brown median dorsal list.

6. By the much smaller extent of the dark markings which border the white of the anal region in *Dama vulgaris*.

In the development from the fan-shaped palm of a definite strong cylindrical beam terminated with points, the new species presents a type of horn which stands unique among existing Cervidæ.

#### Conclusion.

Notwithstanding the fact that the minor groups into which the existing Cervidæ naturally fall is, in a large measure, indicated by certain peculiarities in the external configuration of the horns of the various species, the strong resemblance between the skulls and general appearance of the new species and the common Fallow-deer, leaves no room for doubt as to their close affinity, whilst in the form of their horns they differ widely. If this view be correct, it follows that, although of great general utility to the zoologist, the external configuration of the horns *alone* cannot be considered as a crucial test of affinity amongst the Cervidæ.

#### 7. Description d'une nouvelle espèce de Coq de bruyère.

Par L. TACZANOWSKI, F.M.Z.S.

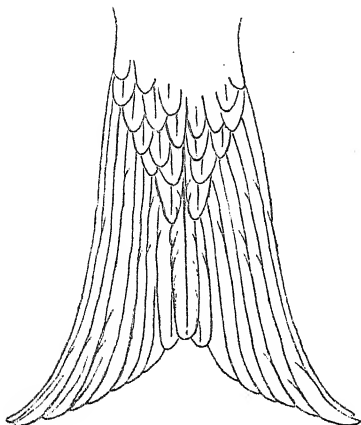
[Received March 4, 1875.]

Je viens de recevoir de Lagodechi (Géorgie Russe) une paire de Tétris différant d'une manière très-sensible du Coq de bruyère d'Europe. Cette différence, qui frappe à première vue, n'est pas moins accentuée que celle qui distingue les deux espèces de Coqs de bois *Tetrao urogallus*, L., et *T. urogalloides*, Midd., ou les *Tetrastes betulina* (Scop.) et la Gelinotte que le Colonel Przewalski vient de découvrir au Tibet septentrional.

La coloration du mâle présente plusieurs détails qui le caractérisent parfaitement et qui suffiraient pour établir une distinction spécifique; la différence de la femelle est encore plus frappante, car sa nuance est complètement différente ainsi que son dessin, de ceux de la femelle du *T. tetrix*. L'oiseau est d'une taille moins forte; ses ailes sont en proportion beaucoup plus courtes et remarquables par la brièveté des primaires; la queue du mâle (fig. 1) est tout-à-fait différente, elle est moins profondément fourchue, ce qui provient d'une plus grande longueur des rectrices médianes, qui en conséquence ne présentent pas d'aussi grande différence en longueur avec les externes que dans l'espèce citée; toutes les rectrices sont moins

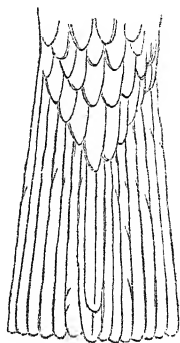
larges, et les extrémités des externes sont peu recourbées sur les côtés, mais distinctement fléchies en bas, à barbes dressées de manière à former une sorte de gouttière assez profonde; les subcaudales se terminent à deux pouces et demi devant les extrémités des rectrices médianes, tandis qu'elles les dépassent d'environ un pouce dans l'oiseau d'Europe. La queue de la femelle (fig. 2) est beaucoup plus

Fig. 1.



Queue du *Tetrao mlokosiewiczzi* ♂,  
 $\frac{1}{2}$  grand.

Fig. 2.



Queue de la femelle *Tetrao mlokosiewiczzi*,  $\frac{1}{2}$  grand.

longue que dans l'espèce commune, elle est coupée carrément à l'extrémité, les deux rectrices médianes sont seulement un peu plus courtes que les autres. Le bec est moins fort; les pattes et les doigts plus minces. Tous ces caractères sont suffisants pour constituer une bonne espèce, dont voici la description.

**TETRAO MLOKOSIEWICZI, n. sp.**

*Mas ex toto nigerrimus, subcaudalibus concoloribus, subalaribus posticis axillaribusque albis.*

*Fœm. griseo brunneoque subtiliter undulata, abdomine medio atro.*

Tout le plumage du mâle est d'un noir très-foncé presque uniforme partout, on remarque cependant un éclat bleuâtre très-faible et peu distinct au cou et au croupion, et une teinte brune sur les tarses. Les subalaires externes\* sont noires, leurs correspondantes du dernier rang grises; les postérieures† et les axillaires sont blanches. Les remiges, moins foncées que la couleur générale, sont à teinte brunâtre à la face supérieure de la barbe externe, et grisâtres à la face inférieure, sans aucun vestige de miroir blanc. Le bec est noir; les

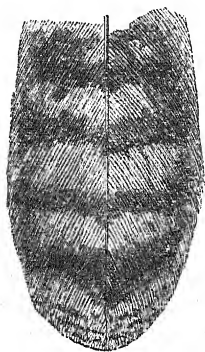
\* Celles du carpe.

† Celles de l'avant-bras.

doigts paraissent être bruns à ongles noirâtres. La partie nue ver-rueuse au-dessus de l'œil est aussi développée que dans l'espèce commune et paraît être de la même couleur rouge.

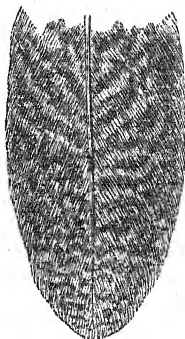
La couleur générale de la femelle est composée de la réunion d'une multitude de raies transversales ondulées et fines\* de nuance brune foncée partout, et d'une autre nuance claire variant sur les diverses parties du corps; ainsi la couleur roussâtre est dominante au dos, au croupion et sur les couvertures alaires, en prenant un ton blanchâtre à l'extrémité de chaque plume, tandis que le blanchâtre est dominant sur tout le dessous du corps et sur le derrière du cou. Sur la gorge et le devant du cou les raies blanches et brunes sont plus larges et plus distancées entre elles. Les subcaudales sont barrées de larges raies noirâtres et rousses, et terminées par une blanche; toutes ces raies claires sont encore semées de quelques

Fig. 3.



Une plume de l'aisselle de la femelle  
du *Tetrao tetrax*, gr. nat.

Fig. 4.



Une plume de l'aisselle de la femelle  
du *Tetrao mlkosiewiczzi*, gr. nat.

taches ou de stries transversales foncées. Les subalaires sont blanches. Le sommet de la tête est brun varié de roussâtre. Les remiges sont brun-grisâtres; la barbe externe des primaires variée irrégulièrement de fauve, celle des secondaires de blanchâtre, ainsi que le bord postérieur de la barbe interne, et terminées d'un liseré blanc. Les rectrices sont brunes avec de nombreuses raies roussâtres fort irrégulières et fort ondulées. Le tarse est fauve, finement ondulé de grisâtre.

*Dimensions.*

	♂ millim.	♀ millim.
Longueur de l'aile pliée . . . . .	200	205
Distance entre l'extrémité des primaires et celle des tertiaires . . . . .	40	40
Longueur de la queue . . . . .	230	170

\* Quatre bandes foncées sur une plume de la femelle du *T. tetrax* et une vingtaine sur une plume correspondante de la femelle de cette espèce nouvelle.

	♂ millim.	♀ millim.
Distance entre l'extrémité des rectrices médianes et celle des externes . . . . .	55	15
Longueur du bec depuis la commissure. . . . .	29	29
„ du tarse . . . . .	50	51
„ du doigt médian sans ongle . . . . .	48	48
„ de l'ongle médian . . . . .	16	12
„ du pouce. . . . .	14	14
„ de l'ongle postérieur . . . . .	11	10

Cet oiseau se tient sur les hautes montagnes de la contrée\*, habitées aussi par le *Megaloperdix caucasicus*. Il nous reste maintenant à étudier ses habitudes et son aire de dispersion.

Je saisis avec plaisir cette occasion pour rendre hommage à mon ami Louis Mlokosiewicz, qui avec une persévérance digne d'admiration ne cesse de recueillir dans la Géorgie Russe, au milieu de mille difficultés, tout ce qui peut enrichir le domaine de l'histoire naturelle, et qui a si justement apprécié, après l'avoir découvert, les caractères spécifiques du bel oiseau que je viens de décrire.

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April 6, 1875.

Dr. E. Hamilton, V.P., in the Chair.

A letter was read from Dr. G. Hartlaub, F.M.Z.S., in which he stated that Dr. Finsch and he had come to the conclusion, from the study of additional examples, that *Lobiospiza notabilis* (the supposed new Finch from the Navigator Islands), described and figured by them in the Society's 'Proceedings' for 1870 (p. 817, pl. xlix.) from a single specimen in spirits, was probably only the young bird of *Amblyjura cyanovirens*.

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Mr. A. G. Butler, F.Z.S., read a "Revision of the Heterocerous Lepidoptera of the family *Sphingidæ*." This memoir will be printed in the Society's 'Transactions.'

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Mr. Osbert Salvin, F.R.S., read a memoir on the Avifauna of the Galapagos archipelago, of which the following is an abstract.

The Galapagos archipelago consists of a group of fifteen islands, together with a number of outlying rocks. Of the former, seven are considerably larger than the rest, one of them, Albemarle, being as large as all the others put together. The group is situated about 600 miles from the west coast of Ecuador, and lies under the equator.

All the islands are of volcanic origin, the number of craters being computed to be as many as 2000. The most western of the islands,

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\* Montagne de Bogosch aux environs de Zakataly, non loin de la route de Tiflis à Derbent, 42° lat. bor., 111° long. de Ferro.

Narborough, as well as Albemarle, is frequently the scene of violent volcanic eruptions—Narborough being from this cause almost entirely devoid of vegetation, its surface presenting vast fields of lava and volcanic scoriæ.

The vegetation in these islands is nowhere dense, but is more luxuriant in the eastern and central islands, especially in the higher grounds inland. These, being usually enveloped in clouds, are damp, and thus foster a richer vegetation than the low-lying lands adjoining the sea-coast.

The climate of the archipelago is mild, owing to the influence of the great south polar current which passes through it. Little rain falls except during the months of November, December, and January; consequently there is a great scarcity of water during the rest of the year—so much so, that water is only to be found, near the sea, during the whole year, in one place in Chatham Island. In the interior of the islands perennial pools exist.

The islands appear to have been first discovered by the Spaniards in the 16th century; but the exact date is not known. The name Galapagos Islands, derived from the abundance of Tortoises found on them, is that under which they appear in a map bearing the date 1592, and under which they are mentioned in the voyage of Sir Richard Hawkins in 1593. There is no reason to suppose that the Spaniards ever frequented them to any extent. To the buccaneers, who cruised along the western shores of America towards the close of the 17th century, they were a place of constant resort—the great Tortoises, as well as the quantity of Turtle and Fish, providing them with fresh food, of which they often stood in need.

The same abundance of food also attracted the whaling-ships after the buccaneers had disappeared from these coasts. The number of whalers requiring refreshments suggested the attempt at colonizing Charles Island; but with the decline of the Whale-fisheries, both ships and colonists have almost disappeared, and, at the present time, these islands appear to be only visited by a few vessels from the coast of the mainland, some for fishing, others for collecting Orchilla or Archil.

The effects on the birds of the Galapagos Islands of the visits of vessels and the attempts at colonization do not appear to have resulted at present in any great diminution in their numbers; but as pigs and goats, as well as cattle, cats, and dogs, are now established in several of the islands, these can hardly fail ultimately to affect the indigenous avifauna. As regards the Tortoises, the appearance of man in these islands has been very destructive. These animals in some of the islands have been wholly extirpated; and in all the large islands old individuals have been killed off, leaving only smaller individuals to represent them.

The earlier writers on this archipelago make few allusions to the Birds. Some of the larger sea-birds are sometimes mentioned, and the Pigeon seems, from its tameness and from its excellence as food, to have usually attracted attention; but no collection of Birds was made until Mr. Darwin visited the islands during the surveying-voyage of H.M.S. 'Beagle' in 1835. A collection of some extent

was then formed; and from the account given of it by Mr. Gould in the Zoological Society's 'Proceedings,' and by Mr. Darwin in 'The Zoology of the voyage of the 'Beagle,' we have the first introduction to the Birds of the archipelago. Two other considerable collections have been subsequently made—one by the officers of the Swedish frigate 'Eugenie,' and the other by Dr. Habel. A few specimens were also obtained during the voyage of the French ship 'Vénus,' as well as a few by Capt. Kellett and Lieut. Wood in the 'Herald' and 'Pandora.' I also suppose that Prof. Agassiz, during the 'Hassler' expedition, collected birds on these islands; but of them, if they exist, no account has ever yet been published.

Fifty-six species of Birds have been recorded as inhabitants of the Galapagos archipelago: of these about two thirds are peculiar to the group; the remainder are species of wide range and belong chiefly to families of Sea-Birds and Waders.

The affinity of the Birds of the islands lies entirely with those of the adjoining continent of South America, whether viewed as regards families, genera, or species.

The distribution of the Birds in the different islands still requires investigation. Few species, however, are restricted in their range to one island; and further research will, I think, tend to show that, so far as the Birds are concerned, hardly any indigenous bird will be found ultimately to inhabit one island alone.

One singular feature is especially worthy of notice with respect to the genus of Finches (*Geospiza*) which frequents the islands. I refer to the remarkable variation observable in the size of these birds, especially as regards their bills. Mr. Darwin was much struck with this circumstance. Individual birds vary to such an extent that I fully believe that a gradual series could be gathered to show that these birds' beaks vary from the size of that of a Hawfinch (*Coccothraustes*) to that of a Bunting (*Emberiza*).

Several species have been characterized from the different sizes of bills of these birds; but were the difference once shown to be capable of being destroyed by the interposition of intermediate specimens, our usual means of defining species would fail, and the result would compel us to unite all under one specific denomination. As Dr. Habel's notes, however, rather tend than otherwise to show that individuals group themselves to some extent with regard to their size, I have thought it best to adhere for the present to the plan adopted by Mr. Gould, and endeavour to differentiate the species described by him. In doing so, however, I feel that I have assigned rather arbitrary specific characters, based on size alone, to some of the so-called species.

Under favourable circumstances for the maintenance of these birds, coupled with a tendency to vary considerably as regards size, natural selection seems to have acted with great laxity in eliminating intermediate forms.

Lastly, I have drawn up a few suggestions to guide future explorers, and have endeavoured to point out as to which islands our knowledge of the avifauna is incomplete or totally wanting. The large island of Albemarle remains practically unexplored. Nothing

is known of the birds of Narborough Island, though little can be expected here from the extreme barrenness of this island. Hood Island offers a better prospect; and Tower Island ought certainly to be visited. Nor ought the smaller islets, such as Barrington Island and Duncan Island, to be omitted when the collector is in search of new ground. The islands already explored are well worthy of further investigation. Of the whole archipelago, Indefatigable Island is the only one where a really extensive series of birds has been obtained, though Dr. Habel's collections from Bindloe and Abingdon islands are by no means small.

In conclusion, I would recommend any one visiting the Galapagos to call at Cocos Island, in N. lat.  $5^{\circ} 33'$ , long.  $86^{\circ} 58' W.$  At present we only know of one land bird from this well-wooded and well-watered island; and that is a peculiar Cuckoo of an American genus, *Coccyzus ferrugineus*. A collection made here cannot fail to be of high interest.

Mr. Salvin's Memoir will be printed entire in the Society's 'Transactions.'

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The following papers were read:—

1. A Monograph of the Siliceo-fibrous Sponges.

By J. S. BOWERBANK, LL.D., F.R.S., F.Z.S., &c.—Part III.\*

[Received March 12, 1875.]

(Plates XXXIX. & XL.)

FARREA GASSIOTTI, Bowerbank.

Sponge cup-shaped, expansive, parietes very thin; pedicel short. Oscula, pores, and dermal membrane unknown. Skeleton siliceo-fibrous; fibres cylindrical, furnished more or less with short acutely conical spines; rete rectangulated; areas mostly square; central canals large and very distinct, not always confluent, frequently two in each fibre. Interstitial spicula rectangulated sexradiate; radii cylindrical, smooth, few in number. Sarcode, dried, dark amber-brown.

Colour, in the dried state, brown?

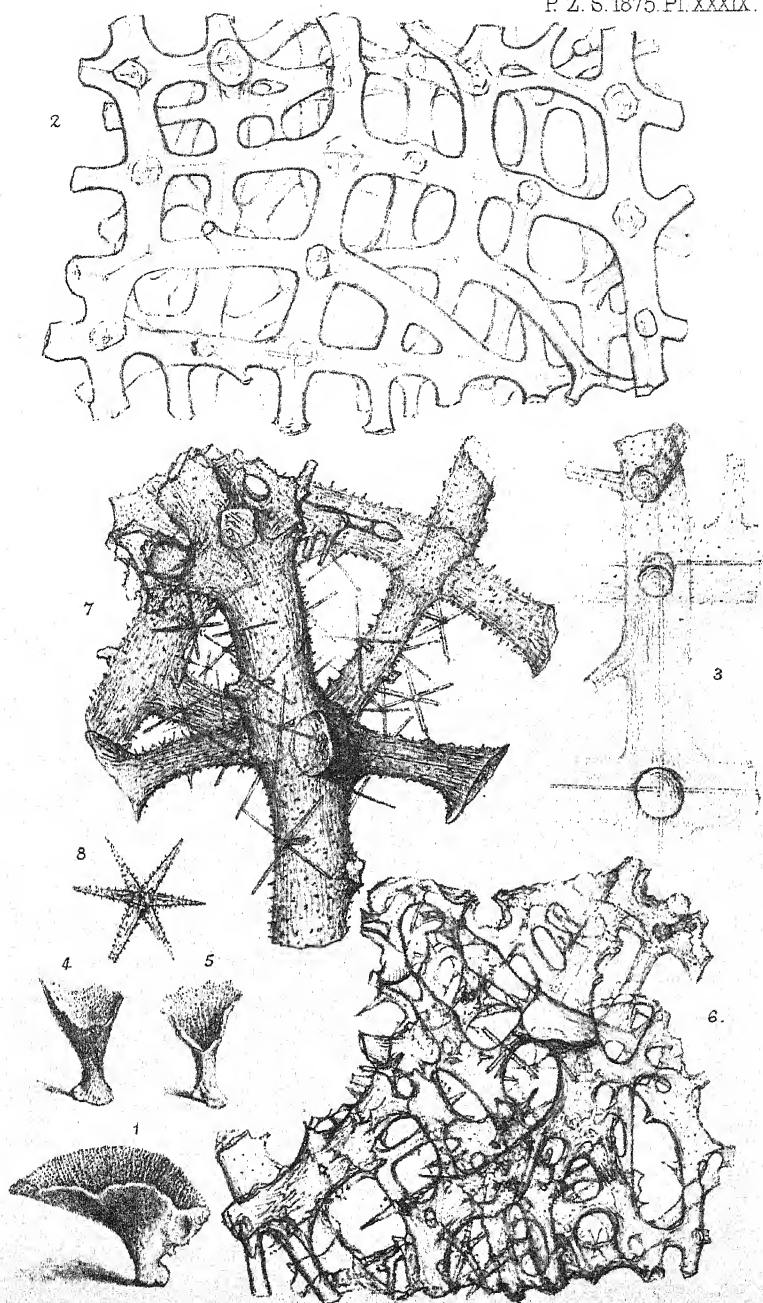
*Hab.* West Indies (*Capt. Hunter, R.N.*).

Examined in the skeleton state.

The type specimen is 9 lines in height. The pedicel does not exceed 2 lines. The cup is partially compressed; it is 1 inch in its greatest marginal diameter, and 8 lines in its smallest breadth. I could not detect the slightest indication of either dermis or oscula. The primary series of skeleton-fibres radiate from the basal portion of the cup, the secondary ones having a circumferential direction at about right angles to the primary ones; they each appear to be as nearly as possible of the same diameter, and to have the central canals and the spination of the fibres equally apportioned. There

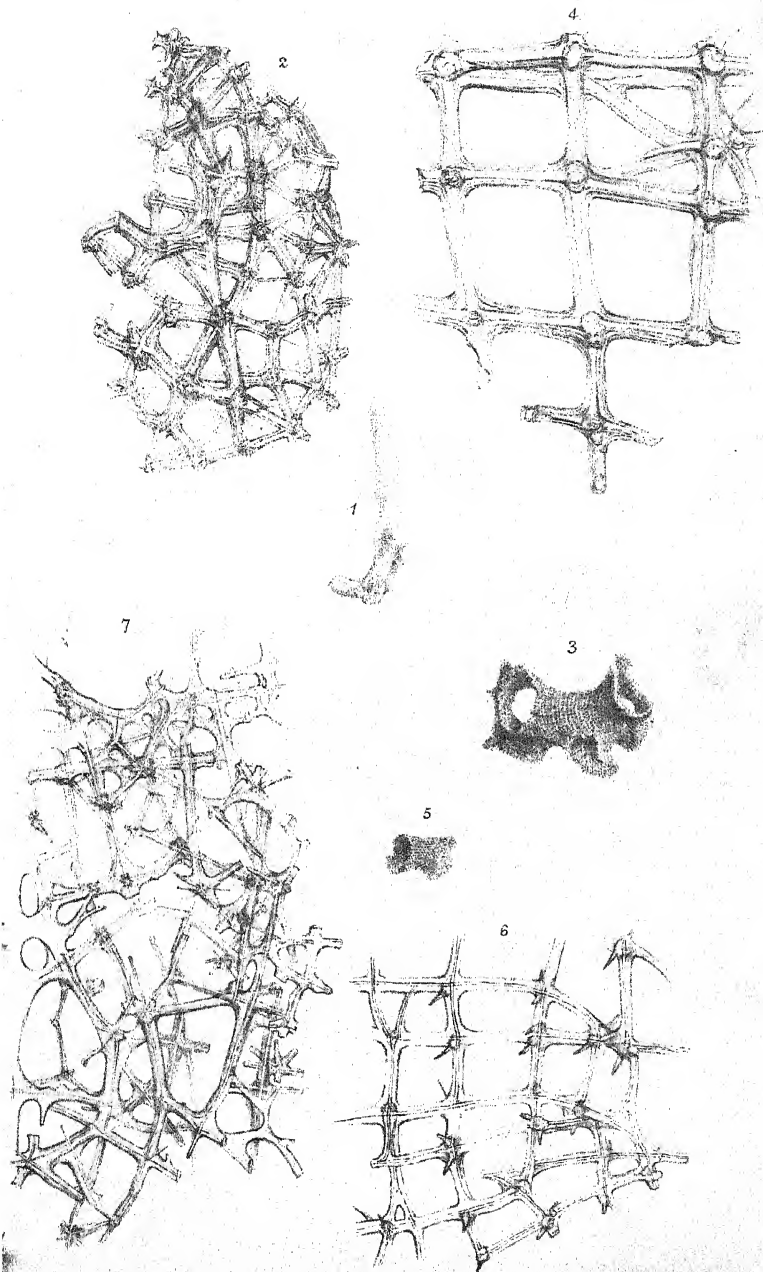
\* For Part II. see Proc. Zool. Soc. 1869, p. 323.





*Farrea Gassioti* 1-3. *F. pocillum* 4-8.





*Deanea virgultosa* 1-2. *Farrea fistulata* 3-4. *F. lævis* 5-6.  
*F. parasitica* 7.



are three or more layers of the skeleton-structure. The fibres of the interior of the cup have the greatest number of spines upon them; those of the outer surface appear to be nearly spineless. The spines are acutely conical; their greatest height rarely exceeds their basal diameters. The fibres and the central canals within them both vary to a considerable extent in their diameter. One of the largest fibres measured  $\frac{1}{158}$  inch and one of the smallest  $\frac{1}{500}$  inch in diameter. The average of three that were measured was  $\frac{1}{288}$  inch. One of the largest canals measured  $\frac{1}{2308}$  inch in diameter; and a very small one in connexion with the large one was  $\frac{1}{7500}$  inch, and the average  $\frac{1}{4904}$  inch in diameter. There does not appear to exist any definite proportion between the fibre and its central canal, a large canal frequently occurring in a small fibre, and a very slender one in a stout fibre. In their course through the skeleton they usually coalesce at each angle of the rete; but it not unfrequently occurs that large fibres have two canals running parallel to each other, as if each had originated at opposite angles of the rete; and occasionally one or both terminate in a spherical dilatation. A few of the interstitial spicula fortunately remain entangled in the skeleton-rete. They are small, rectangulated, sexradiate forms, with smooth cylindrical radii, and are all of about the same size. Some portions of the skeleton-fibres were covered by a very thin layer of sarcode of a bark-brown amber-colour.

The sponge was apparently a skeleton when brought up from the bottom of the sea; but although so many important characters are absent, those available are sufficiently striking to render its discrimination from other nearly allied species satisfactory.

I have named the species after Dr. Gassiot, through whose kindness I have had the opportunity of examining and describing it. The specimens were dredged on the 22nd July, 1872, lat.  $14^{\circ} 8' N.$ , long.  $77^{\circ} 38' W.$ , 800 to 1000 fathoms; and Dr. Gassiot in his letter to me states, "Reliance can be placed on statement of locality, depth &c., as the specimens were put into bottles and marked by Capt. Hunter, who is a most energetic officer and careful observer."

#### FARREA POCILLUM, Bowerbank.

Sponge cup-shaped, contracted; pedicel short; parietes thin. Oscula, pores, and dermal membrane unknown. Skeleton siliceo-fibrous; fibres cylindrical, furnished more or less with short acutely conical spines; rete more or less rectangulated, rather irregular; central canal very slender, often terminating abruptly in a caecoid manner. Internal defensive organs rectangulated sexradiate, rather large, based on the sides of the fibres; radii attenuated, abundantly spinous, and also furnished rather abundantly with rectangulated sexradiate spicula, small and slender; radii attenuating, incipiently spinous. Sarcode dark and opaque.

Colour, in the dried state, very faint rose-pink.

*Hab.* West-Indian seas (*Capt. Hunter, R.N.*).

Examined in the dried state.

I am indebted to my late friend Mr. Henry Deane for two specimens of this interesting species; neither of them exceeds 8 lines in height and 5 in greatest diameter. From their form and other external characters they might readily have been mistaken for specimens of *Farrea gassioti*; but a microscopical examination readily separates them from that species. As was the case with *F. gassioti*, the characters derivable from the dermis, oscula, and pores were not available; so that the discrimination of the species was in a great measure dependent on the structural peculiarities of the skeleton; and the resemblance of the two species in size, form, and mode of arrangement of the spicula is very close; but they differ very strikingly in the characters afforded by the central canals of the skeleton-structure. In those of *P. gassioti*, when examined beneath the microscope in Canada balsam with a power of 108 linear, they are strikingly large and distinct, while in *F. pocillum*, although the fibres of the two species are as nearly as possible of the same size, they are remarkably slender, and in some cases nearly obsolete; and this was the case in portions taken from both of the specimens in my possession. These distinctive characters are quite sufficient to separate the two species; but there are fortunately others that aid materially in their discrimination. Thus in *F. pocillum* there are numerous internal defensive organs of a rectangular sexradiate form, based on the sides of the skeleton, and projected into the areas of the rete. These organs are comparatively large and strong, and are abundantly furnished with large conical spines. Sometimes the primary central portion of these organs is destitute of the four lateral radii; and occasionally the lateral radii are doubled in number, a second set of them being projected beyond the first ones. In addition to these internal defensive organs there are numerous unattached rectangular sexradiate spicula, occasionally grouped together in considerable numbers on the areas of the skeleton-rete. These spicula are very distinct from those organs of the same form which are based upon the skeleton-fibre; they are very much smaller, and their radii are slender and usually spineless. All are alike acutely terminated, and have evidently never been based upon the skeleton-fibres, as the organs first described always are. The presence of these organs in the one species and their apparent complete absence in the other strongly confirms the propriety of their separation, notwithstanding the close resemblance they bear to each other in external form.

The specimens were dredged July 22, 1872, in lat.  $14^{\circ} 8' N.$ , long.  $77^{\circ} 38' W.$ , 800 to 1000 fathoms, by Capt. Hunter, R.N.

DEANE, Bowerbank.

Skeleton siliceo-fibrous. Fibres canaliculated; canals continuous. Rete symmetrical; areas rotulate, confluent.

This genus is intermediate between *Iphiteon* of Valenciennes and *Farrea*. The skeleton has the confluent rotulate structure of the former, but differs from it in having the fibres distinctly canaliculated. It agrees with the latter genus in the canaliculation of the

skeleton-fibre, but it differs essentially from it in the form of its reticular arrangement.

I have named the genus after my late friend Mr. Henry Deane, to whom I am indebted for my knowledge of the sponge.

*DEANEA VIRGULTOSA*, Bowerbank.

Sponge sessile (?), virgultose, solid, irregularly cylindrical. Surface even. Oscula, pores, and dermis unknown. Skeleton symmetrical; fibre cylindrical; central canals large and very distinct.

Colour, in the dried state, amber-brown.

*Hab.* West-Indian seas?

Examined in the skeleton condition.

All that remains of this interesting sponge is unfortunately its well-washed skeleton, so that little more can be said of it than what appertains to its generic characters; but these are fortunately very distinctive. The specimen is  $1\frac{1}{4}$  inch long, and of an average diameter of about 2 lines. Which has been its basal end cannot be determined, as both are broken terminations. The substance of the sponge is very compact, there being no central cavity. There are no indications on its surface of oscules, and not the slightest remains of either dermal membrane or sarcode.

When a section of the sponge is made at right angles to its long axis, mounted in Canada balsam and viewed with a power of 100 linear, its structure is beautifully displayed. Its singular confluent rotulate rete is as regular as that of *Iphiteon*, described and figured in the 'Proceedings' of this Society for May 1869, p. 323, pl. xxi. figs. 1 & 2. No other form of structure occurs in the skeleton; and whether we view a transverse section, a longitudinal one, or the surface of the sponge, the same rotulate structure is presented to the eye.

The canaliculated structure is very strongly produced. The canals radiate from the axis of each rotulum, and usually appear to be continuous through the whole of the skeleton-structure; occasionally, but not frequently, a single ray will be entirely destitute of the central canal; but this is the exception, not the rule. The skeleton-fibres vary in diameter from  $\frac{1}{850}$  inch to  $\frac{1}{333}$ ; but the general average is about  $\frac{1}{350}$  inch. The central canals are large in proportion to the size of the fibres; their range in diameter is from  $\frac{1}{1000}$  inch to  $\frac{1}{333}$  inch, but their average diameter is about  $\frac{1}{1500}$  inch. They are not always in proportion to the size of the fibre, the largest canals being frequently in the smallest fibres.

Since the above description was written I have received a small fragment of another specimen of the sponge. It is a piece of a similar small cylindrical mass, about 3 lines in length and rather less in its diameter. In this specimen there are remains of sarcode thinly coating some of the skeleton-fibres; and in many of them the canals are lined with a sarcodous membrane of a dark amber-brown colour, a strong evidence that the sponge was in a living state when taken. No spicula of any description could be detected in any part of the

specimen. The confluent rotulate form of skeleton-structure is not confined to the siliceo-fibrous sponges; it also occurs in the dermis of a rare British sponge, *Desmacidon rotalis*. In this case it does not occur in the internal skeleton of the sponge, but in the reticulated dermis only. I have figured this beautiful dermal tissue in vol. iii. pl. xc. fig. 9, 'Monograph of the British Spongiadæ.'

The specimen of *Deanea virgulosa* figured was presented to me by my late friend Mr. H. Deane, along with those of *Farrea gassioti* and *pocillum*; and I presume it is from the same locality as those species.

*FARREA FISTULATA*, Bowerbank.

Sponge fistulous, orifices both terminal and lateral, very large, parietes thin. Surfaces, exterior and interior, even, but rough to the touch, each abundantly armed with a single series of harrow-like teeth, based on the angles of the skeleton-tissues, and projected outwardly from their respective surfaces. Oscula and pores unknown. Dermal membrane thin, abundantly spiculous; tension-spicula acerate, variable in size, rather numerous; retentive spicula simple and contort, bihamate, numerous, dispersed. Skeleton-fibre cylindrical, smooth and even; canals large and very distinct; rete symmetrically quadrangular, areas usually square. Internal defensive spicula attenuato-acuate, basally spined, based on the skeleton-fibres, projected at about right angles into the areas of the rete. Sarcode dark amber-colour, thinly coating the skeleton-structures.

Colour, dried state, dark amber-brown.

*Hab.* West-Indian seas?

Examined in the dried state.

This remarkable sponge consists of a single thin stratum of skeleton-tissue in the form of a compound pipe about four lines in diameter. It has all the appearance of being only a portion of a more perfect specimen. It is but an inch in length, but in that short space it has six open terminations of what has apparently been as many ramifications of its fistulous structure; and none of these orifices have a natural or an even margin. The general surface of the specimen is even, and no indications are apparent of either oscula or pores. The dermal membrane is in an excellent state of preservation on the surface of the sponge; and from its present condition it was evidently in a living state when taken. It is a thin translucent structure, abundantly spiculous. The tension-spicula are slender and acerate, not very numerous; they are variable in size and irregularly disposed on the surface of the membrane. The bihamate retentive spicula are rather numerous dispersed on the membrane; they are slender and very equable in size. The skeleton is a remarkably beautiful structure. The fibre is perfectly smooth, very equable in its diameter, and it is arranged as nearly as possible in a regular quadrangular network. The central canals are moderately large and very distinct, and are as equable in their diameter and mode of distribution as the rete of the skeleton is. The thin stratum of



skeleton-structure appears to consist of two and sometimes three layers of this beautiful network. The outer and the inner layers are powerfully armed by a single series of stout harrow-like teeth projected from the angles of the network at right angles to the surface; and each of these teeth is furnished with numerous imbricated scales, like the similar organs in *Farrea occa*, described in the 'Proceedings of the Zoological Society of London,' for May 13, 1869, p. 339. These organs in the species under consideration differ from those in *F. occa* in being longer and more slender in their proportions. If the specimen be examined by direct light with a power of 50 linear, these structures are exhibited in a very beautiful manner, projecting outwardly from the angles of the dermal layer of the quadrangular network at right angles to its surface, and from the internal skeleton-layer in like manner into the interior cavity of the sponge, while the intermediate layer or layers of the skeleton are entirely destitute of these organs; but in place of them they are abundantly furnished with attenuato-acuate entirely spined internal defensive spicula, which are based on the sides of the skeleton-fibres, and are projected at various angles into the areas of the rete. These internal defensive spicula are very numerous where the fibre is well coated with the dark amber-coloured sarcodæ; but when the sarcodæ is absent not a single spiculum is to be seen on the fibres. The skeleton-fibres of the interior surface do not appear to be furnished with internal defensive spicula; but those of the outer and intermediate layers are abundantly furnished with them. These spicula vary to a considerable extent in size, the longer being frequently twice the length of the shorter ones. The basal half of both is abundantly spinous, while the distal half is usually entirely spineless. The spines are short and acutely conical. I could not detect any interstitial membranes; but a few large acerate spicula were observed in the interstitial spaces; but whether they belonged to the sponge or were adventitious I could not determine, as several other forms of spicula were observed on both the outer and the inner surfaces of the sponge. On examining the interior of the sponge with a lens of two inches focus through one of the large terminal orifices I observed a small patch of flocculent-looking sponge-tissue; and on removing a portion of this and mounting it in Canada balsam, it proved to be a very young *Hymedesmia johnsonia* in an excellent state of preservation, with numerous specimens of that remarkable form of spiculum, the trenchant contort bihimate, dispersed among the acerate skeleton-spicula of that sponge, and closely resembling the portion of the type specimen represented in vol. i. plate xviii. fig. 293, 'Monograph of British Spongiadæ.' The occurrence of this well characterized sponge parasitical within the *Farrea* is a remarkable circumstance, and it seems to indicate that the open tubular structure of that sponge is probably its normal condition. Beside *Hymedesmia johnsonia*, naturally parasitical on its inner surface, there were two other small groups of sponge-spicula that were evidently adventitious. One consisted of numerous short entirely spined cylindrical spicula distributed irregularly over the fibres of three or four areas of the skele-

ton of the *Farrea*. The other groups consisted of two small densely compacted masses of very minute cylindro-stellate spicula with acutely conical radii: one of these groups just filled a skeleton-area; the other, of a similar size, was not entangled in the skeleton-structure, but adherent to it externally; and within the little mass were a few spiculated biternate spicula, like those found in *Farrea occa*, figured in vol. i. plate ix. fig. 199, 'Monograph of British Spongiadæ.' A few minute anchorate spicula of different forms were also observed among the skeleton-fibres. These occurrences would seem to indicate that the locality whence this sponge was obtained would be a very prolific ground for scientific dredging. I received this sponge from my late friend Mr. H. Deane, with the specimens of *Farrea gassioti* and *poillum*; and I therefore presume it is from a West-Indian locality.

*FARREA LÆVIS*, Bowerbank.

Sponge-mass unknown. Dermis furnished with a quadrilateral siliceo-fibrous network. Rete armed at the angles oppositely externally and internally with smooth elongate-conical attenuated spicular defences. Fibre smooth and spineless; central canals large and very distinct, confluent at the angles, frequently two, rarely three, in each fibre. Dermal membrane thin, aspiculous. Sarcodæ amber-brown.

Colour, in the dried state, brown?

*Hab.* West-Indian seas?

Examined in the dried state.

I am indebted to my friend Mr. Henry Lee for my knowledge of this species. He found it on some sand dredged up by Mr. Marshall Hall during his voyage in the 'Norna.' The sand was preserved by Mr. W. Saville Kent, and was presented by him to my friend. Mr. Lee sent me the specimen for examination. It is a fragment of a very fragile tubular sponge, which consists of only one layer of siliceo-fibrous tissue. It is five lines in length, and does not exceed three lines in diameter. The form of the fibres and their mode of arrangement very closely resemble those of the dermal tissue of *Farrea occa*; but they differ from those of that species in being smooth and quite destitute of spines, and also in being furnished abundantly with central canals. The conical spicular external defences at the angles of the rete differ also from those of *F. occa*, as, instead of being imbricated as in that species, they are quite smooth and each is furnished with a well-developed central canal. The canals in the fibres of the rete form a very prominent feature in this sponge; they are large and well developed, and are confluent at the angles of the network. There are frequently two in each fibre, one appearing to emanate at each end; when they meet they do not unite, but run parallel to each other to their opposite angles.

The dermal membrane is preserved in a few of the areas of the network. It is thin and transparent, and is well coated with sarcodæ, but I could not detect a single spiculum in any part of it. The

smoothness of the skeleton and the well-developed system of canals in the fibres at once distinguish this species from either *F. occa* or *F. spinulenta*. It is remarkable that the sponge appears to consist of a single layer only, as I could not find the slightest trace of any other siliceo-fibrous structure on any part of the specimen.

Mr. W. Saville Kent has evidently mistaken this species for *Farrea occa* in the description he gives of that species in the 'Microscopical Journal' for Nov. 1870, p. 248, plate lxiv. figs. 12-18; and he has correctly figured the central canals in the dermal network of his specimen (fig. 13), whereas in the corresponding organs of *Farrea occa* no such canals are visible. The description of the sponge represented in the same plate by fig. 12 is quite in accordance with the small fragment of the species *F. laevis* that I received from Mr. Lee. Mr. Kent writes, "The skeleton of this sponge is composed of a series of infundibular netted tubuli branching out from one another and occasionally coalescing." The branching fistular form represented by Mr. Kent in fig. 12, plate lxiv. 'Microscopical Journal' for Nov. 1870, occurs also in *F. tubulata*, very much in the shape represented by Mr. Kent; but the other specific characters differ to a very considerable extent from those of *F. laevis*. I received this sponge from my late friend Mr. H. Deane, along with the specimens of *Farrea gassioti* and *pocillum*; and I presume it is from the same locality as those species.

#### FARREA PARASITICA.

Sponge parasitic, coating. Surface irregular? Oscula, pores, and dermal membrane unknown. Skeleton-rete irregular; fibres depressed, occasionally confluent, very irregular in breadth; canals distinct, variable in diameter, not always confluent, but usually so.

Colour translucent as glass.

*Hab.* West Indies (*Captain Hunter, R.N.*).

Examined in the skeleton state.

During the course of my examination of the beautiful little specimen of *Farrea gassioti*, I observed on the inner surface of the sponge several small thin patches of siliceo-fibrous tissue, very much finer in structure than the skeleton of the sponge to which they were attached. On removing small portions of these tissues and mounting them in Canada balsam I found them to be strikingly different in all their specific characters from the sponge on which they reposed, and especially so in the size of their skeleton-fibres—the average diameter of those of *F. gassioti* being  $\frac{1}{2} \frac{1}{38}$  inch, while those of *F. parasitica* was  $\frac{1}{13} \frac{1}{103}$  inch; and the canals in the former species averaged  $\frac{1}{4} \frac{1}{90}$  inch in diameter, while in the latter one their average was  $\frac{1}{93} \frac{1}{75}$  inch. These discrepancies, if there were none other, distinctly separate them as species, although in such close contact in their natural condition. I could not, with a power of 100 linear, detect any indications of a natural dermal surface, nor could I by any means find portions of dermal or interstitial membranes or of sarcode; our sole dependence, therefore, is upon the structural pecu-

liarities of the skeleton; and in these fortunately there are very sufficient distinctive characters to assist us in the description of the species. In some of the little patches of this parasitical sponge there are several layers of the skeleton-structure, while in other cases it spreads like a single network over the surface of the sponge upon which it is parasitical.

There is no definite arrangement in the skeleton-rete, and the areas assume a great variety of forms. The skeleton-fibre is always more or less depressed; and in some cases two or more fibres coalesce, forming small broad plates of siliceous structure in which two or three canals may be seen running in parallel lines. The fibres in their normal condition vary to a considerable extent in their diameter: the largest measured was  $\frac{1}{427}$  inch, whilst the smallest was  $\frac{1}{3000}$  inch in diameter; the average diameter of four measured was  $\frac{1}{1380}$  inch. The central canals of the fibres also vary in their diameter; the largest was  $\frac{1}{3750}$  inch, and the smallest  $\frac{1}{5000}$  inch in diameter. Their course through the fibres is not always continuous; and frequent cases occur in which they terminate abruptly before reaching the angle of the network towards which they are progressing.

The specimen described is the only one I have yet seen; but it is probable that it will be found parasitical on other species of siliceo-fibrous sponges beside *Farrea gassioti*.

The locality is the same as that of *F. gassioti*, lat.  $14^{\circ} 8' N.$ , long.  $77^{\circ} 38' W.$ , in 800 to 1000 fathoms.

#### EXPLANATION OF THE PLATES.

##### PLATE XXXIX.

Fig. 1. *Farrea gassioti*, natural size.

2. A small portion of the outer surface of the skeleton of *F. gassioti* from the distal margin of the specimen represented by fig. 1,  $\times 36$  linear.

3. A small portion of the piece of the skeleton represented by fig. 2, exhibiting the mode of the canaliculation of the fibre of the skeleton,  $\times 80$  linear.

4 & 5. Two specimens of *Farrea pocillum*, natural size.

6. A portion of the skeleton of *F. pocillum* from the specimen represented by fig. 5, exhibiting the more or less irregular mode of its reticulation,  $\times 36$  linear.

7. A small piece of the skeleton of the specimen represented by fig. 4, exhibiting the spination of the skeleton-fibres and the numerous rectangular sexradiate defensive organs *in situ*,  $\times 80$  linear.

8. One of the rectangular sexradiate defensive organs, exhibiting the mode of its spination,  $\times 150$  linear.

##### PLATE XL.

Fig. 1 represents a specimen of *Deanea virgultosa*, natural size.

2. A portion of the skeleton of the specimen represented by fig. 1, exhibiting the rotulate mode of arrangement of the skeleton-rete and the large central canals within the fibre,  $\times 36$  linear.

3. *Farrea fistulata*, natural size.

4. A small piece of the skeleton of the specimen represented by fig. 3, exhibiting the quadrangular form of the rete and their large central canals,  $\times 36$  linear.

5. A portion of a specimen of *Farrea levis*, natural size.

6. A fragment of the specimen represented by fig. 5, exhibiting the form of

the dermal rete with its central canals, and the smooth elongate-conical defensive organs,  $\times 36$  linear.

Fig. 7. A small portion of the siliceo-fibrous skeleton of *Farrea parasitica*,  $\times 80$  linear.

## 2. Contributions to a General History of the *Spongiadæ*.

By J. S. BOWERBANK, LL.D., F.R.S., &c.—Part VII.

[Received March 12, 1875.]

When my friend Commodore Parish went out to China to take the command at Hong Kong, he kindly promised to render me any assistance in his power in the collection of Sponges and other specimens of natural history; and I am pleased to say he has performed his promise in a most effective and liberal manner. By far the greater number of specimens of Sponges sent home to England are so carefully and effectually washed instead of being dried immediately in the condition in which they come from the sea, that the greater portion of their most valuable specific characters are completely destroyed. This destructive process has been carefully avoided in the preservation of the specimens which form the subjects of the present communication; and the descriptions of these specimens are the more valuable to science as they lead us to the conclusion that the species at that distant portion of the earth are in reality very closely allied in their generic and other anatomical characters to those of our Northern European seas.

### MICROCIONA TUBEROSA, Bowerbank.

Sponge massive, sessile, tuberous; tuberous projections corrugated, minutely spinous, more or less fistulous. Oscula simple, small, dispersed. Pores inconspicuous. Dermal membrane pellucid, spiculous; tension-spicula acute, slender, dispersed, rather few in number. Skeleton-columns rather stout, anastomosing, forming a coarse, open, and somewhat complicated rete; skeleton-spicula acute, rather long and slender; internal defensive spicula attenuato-acuate, small, entirely spinous. Interstitial membranes spiculous; tension-spicula slender, acute, few in number.

Colour, in the dried state, dull pale green.

*Hab.* Straits of Malacca (*Commodore Parish, R.N.*).

Examined in the dried state.

This very remarkable sponge was sent to me by my friend Commodore Parish with several other interesting and valuable specimens collected in the Straits of Malacca. It is based on the surface of another species of sponge, a unispiculous *Halichondria*, which it almost entirely covers, and with which it is so intimately incorporated, and so closely resembles it in colour, as to render it very difficult to discriminate the two without a microscopical examination of their structures. Its external form is singular and very characteristic. It is  $2\frac{1}{2}$  inches long,  $1\frac{1}{2}$  broad,  $1\frac{1}{4}$  inch in height; and its external

surface is entirely composed of tuberos projections, the surfaces of which are minutely corrugated. They vary from a  $\frac{1}{4}$  to  $\frac{1}{2}$  an inch in height, and in diameter from 2 to 4 or 5 lines. Their distal terminations are slightly convex or nearly flat, with a simple orifice frequently on the summit, and when in this condition they are more or less fistulous. The oscula are simple perforations, seldom exceeding the size of one of the skeleton-areas. The dermal membrane is pellucid. It is rather sparingly furnished with slender acuate tension-spicula, which are of the same form as those of the skeleton columns, but rather shorter and more slender; and intermixed with the tension-spicula there are numerous minute grains of sand and other extraneous matters adherent to the outer surface of the membrane.

The skeleton in this species is more complicated in its structure than it is in the greater number of the known species of the genus, the skeleton-columns anastomosing more frequently and more regularly than is usual; so that the skeleton assumes the form of a rudely constructed reticulation. The skeleton-columns are stout and strong, abounding in keratode, in which their long, slender, acuate spicula are somewhat loosely distributed; and along with them there are frequently minute grains of extraneous matter imbedded. The columns are abundantly supplied with internal defensive, attenuato-acuate, entirely spined spicula; they are projected at nearly equal distances and at right angles to the surface into the interstitial spaces, so as to present an exceedingly formidable series of weapons of defence against the attacks of any intrusive annelids or other enemies. These defensive spicula require a linear power of about 300 to render their forms and spination distinctly to the eye.

The interstitial membranes are furnished with a few tension-spicula and extraneous grains of sand in a manner very similar to that of the dermal membrane. The spicula of this species have their nearest alliance in form to those of our British species *M. fallax*; but the structural characters of the sponge in other respects are very strikingly different.

In the spicula prepared by boiling in nitric acid and mounting in Canada balsam there were numerous adventitious forms of spicula, which the peculiarities of the structure of this sponge is especially liable to collect and retain; but of these very few, comparatively, could be detected on the interstitial membranes of the sponge.

#### HYMERAPHIA SPINULARIA, Bowerbank.

Sponge coating, very thin. Surface even, strongly hispid. Oscula simple, minute, dispersed. Pores inconspicuous. Dermal membrane pellucid, sparingly spiculous; spicula same as those of the skeleton. Skeleton and external defensive spicula subfusiformi-spinulate, long and rather slender, very numerous. Internal defensive spicula subfusiformi-spinulate, comparatively short and stout, numerous.

Colour, in the dried state, light ochreous yellow.

Hab. Coast of Corea (*Commodore Parish, R.N.*).

Examined in the dried state.

This sponge is parasitical on the shell of a large specimen of *Spondylus spathuliferus* (?), which measures from the hinge to the front of the shell nearly 3 inches. It completely covers every part of the shell and all its spines, many of which exceed 1 inch in length; and in no part does it appear to exceed in thickness a stout sheet of paper. The surface is abundantly but minutely hispid by the projection of the skeleton-spicula through the dermal membrane for about half their entire length, thus performing the offices of external defensive spicula as well as those of the skeleton. The oscula are simple orifices, so minute as not to be readily detected even with the aid of a lens of 2 inches focus. In the specimen under description there are appearances very liable to deceive an observer in search of these organs, as they assume a form very likely to deceive the eye, that of little conical elevations terminating in small circular orifices.

These fallacious appearances are thus produced. Before the shell was covered by the sponge a considerable number of small *Balani* had built upon its upper valve and also upon some of the spines; and these shell-parasites have become so completely covered by the sponge as to leave only the terminal orifice of each visible, simulating in a remarkable manner what might readily be mistaken for the oscula of the sponge. The dermal membrane is pellucid; it is situated about midway between the bases of the skeleton-spicula and their apices; and a few spicula of the same size and form as those of the skeleton are distributed on its surface. The skeleton-spicula all spring from the basal membrane of the sponge, and are projected through the dermal one for about half their lengths: they vary to some extent in length; a fully developed one measured  $\frac{1}{4}$  inch in length; and as they pass for about half their length through the substance of the sponge, its entire thickness will be about  $\frac{1}{10}$  inch. The skeleton-spicula are all more or less fusiform, and in many of them the spinulate base is very slightly produced; their greatest diameter is  $\frac{1}{2308}$  inch.

The internal defensive spicula all spring from the basal membrane: their average length is  $\frac{1}{214}$  inch; and their diameter is rather less than that of the skeleton-spicula; some of the largest of them reach very nearly to the inner surface of the dermal membrane.

This species is closely allied to the British *Hymenaphia simplex*; but it differs from it in having the skeleton-spicula much more slender and delicate, and in their fusiform shape, and also by the total absence of attenuato-spinulate incipiently spinous defensive spicula.

#### RAPHIODESMA PARISHII, Bowerbank.

Sponge sessile, coating thinly, even, minutely hispid; spicula acuate, same as those of the skeleton, visibly reticulated. Oscula simple, dispersed, small, rather few in number. Pores inconspicuous. Dermal membrane abundantly spiculous, reticulated; rete multispiculous, strongly developed; areas rather irregular in form, but nearly equal in size; spicula of rete acuate, same size and form as those of the skeleton; tension-spicula biclavate cylindrical, very slender, dispersed or loosely fasciculated, and tricurvate acerate, small and

very slender. Retentive spicula inequidentato-palmate anchorate, congregated in circular groups or dispersed, large and strong; and very minute palmato-inequianchorate, dispersed; also very minute, bidentate, equianchorate, dispersed; and also bidentate, equianchorate, rather large and stout, few in number; also bihamate simple and contort large and strong, and the same form very minute and slender. Skeleton-fasciculi more or less multispiculous; bases and apices of the component spicula coincident, irregularly disposed; spicula acuate, stout, moderately long; basal membrane stout, somewhat coriaceous, abundantly armed with attenuato-acuate entirely spined internal defensive spicula; interstitial membranes spiculous; spicula same as those of the dermal membrane, rather sparingly dispersed.

Colour dull cream-white in the dried state.

*Hab.* Straits of Malacca (*Commodore Parish, R.N.*).

Examined in the dried state.

I received six specimens of this very interesting sponge from my friend Commodore Parish, who obtained them from the Straits of Malacca. The largest measured  $3\frac{1}{4}$  inches in length by  $1\frac{3}{8}$  broad, and its greatest thickness does not exceed about  $\frac{1}{8}$  of an inch. It entirely covers a mass of *Cellepora* about a  $\frac{1}{4}$  of an inch in thickness. The surface appears smooth to the eye, but it is really minutely hispid. The hispidation is produced by the projection of about half the length of the spicula of skeleton-fasciculi; the distal ends of each of them separate divergingly, forming an infinite number of minute external defensive groups; as the amount of their projection does not exceed  $\frac{1}{160}$  inch, this character is only to be observed in sections at right angles to the surface mounted in Canada balsam. This radiating expansion of the skeleton-fasciculi at the surface of the sponge, so as to form an efficient system of external defence, is on the same principle as the expansion of the distal terminations of the primary fibres of the skeleton of many species of the genus *Isodictya*, thus exhibiting in a very different mode of the construction of the skeleton the same economic design in the production of a series of organs of external defence. In other genera where this beautiful mode of adaptation is inapplicable, especial systems of spicula are provided to achieve the necessary defences of the dermal surface.

The dermal membrane and the interstitial tissues are remarkably rich in defensive and retentive spicula; and I have never found in any other sponge so great a number of forms and so much variety of size as in this species. The dermal rete is very strongly and compactly constructed; but the spicula composing it have not their terminations coincident as in the skeleton-fasciculi. Both forms of tension-spicula are small and slender. The biclavate cylindrical ones are  $\frac{1}{150}$  inch in length and  $\frac{1}{10000}$  inch in diameter; the greater number of them are collected into fasciculi containing from five to eight or nine spicula; and others are singly disposed among the rest of the spicula. The fasciculi have no especial mode of distribution.



The tricurvate acerate tension-spicula are also very small and slender; one of the largest of them measured  $\frac{1}{300}$  inch in length: the curves of these spicula are not very strongly produced, and some of them exhibit but faint traces of curvature; they are not very numerous. The retentive spicula are especially remarkable for the great variety of their size and form. The largest of the retentive spicula, the inequidentato-palmate anchorate ones, are congregated in rosette-shaped groups, a few only appearing singly located. The groups of these spicula so characteristic of the genus *Raphiodesma* are not very numerous, nor do they contain so many spicula as those we observe in some other species of the genus; the usual number is about eight or ten in each. They are situated on the basal membrane as well as on the inner surface of the dermal one, just as similar groups of such spicula are dispersed on the inner surface of our British species *R. lingua*, in which they are frequently crowded together in considerable numbers. The spicula in the species in course of description are strongly produced; an average-sized one measured  $\frac{1}{481}$  inch in length, and the breadth of the broad spatulate distal end was  $\frac{1}{1000}$  inch. These dimensions contrast strongly with those of the numerous small inequipalmate anchorate ones dispersed on the surface of the membranes, the average length of which is  $\frac{1}{1428}$  inch; and the contrast is still greater with the very minute palmato-equianchorate ones, two of which measured respectively  $\frac{1}{2808}$  and  $\frac{1}{3000}$  inch in length; so that a considerable number of the latter ones might be shovelled up as in a scoop by one of the large form of these spicula which compose the large rosette-like groups. One of the stout bidentate equianchorate spicula measured  $\frac{1}{488}$  inch in length. A similar difference in size occurs between the two sorts of bihamate spicula. The larger of the two measured  $\frac{1}{360}$  inch in length, with greatest diameter of the shaft  $\frac{1}{3614}$  inch, while the length of one of the smaller description of this form was  $\frac{1}{1510}$  inch.

The fasciculation of the skeleton is very variable; some of the bundles contain numerous spicula, while others consist of two or three only; and the mode of disposition of the fasciculi is also very irregular. The spicula in all the bundles appear to have their bases and apices coincident. The length of an average-sized skeleton-spiculum is  $\frac{1}{80}$  inch, and the diameter  $\frac{1}{2307}$  inch.

The basal membrane is abundantly armed with numerous attenuato-acuate entirely spined internal defensive spicula projected at right angles to its inner surface. In the basal portion of the sponge a thin stem of a *Tubularia* was imbedded; and this was closely surrounded by basal membrane, from all parts of which numerous internal defensive spicula were projected. This curious habit of the sponge to surround included extraneous matters with membrane, and then to project defensive spicula from their surfaces, I have several times observed in some of our British sponges.

On the surface of another sponge from the same locality I found a very young specimen of the sponge under description not exceeding a  $\frac{1}{4}$  of an inch in diameter and as thin as a piece of paper. The dermal membrane was in a fully developed condition; the basal

membrane was present as a very thin film; and the skeleton was indicated by a few straggling spicula only; so that in this state the specimen might have been readily mistaken for a *Hymedesmia*.

I have named this remarkably interesting species after my good friend Commodore Parish, to whom I am indebted for it and many other interesting sponges, and also for numerous other interesting and valuable specimens of natural history.

*HALICHONDRIA ELEGANTIA*, Bowerbank.

Sponge massive, sessile. Surface variable but smooth, or but slightly rugose. Oscula simple, dispersed. Pores inconspicuous. Dermal membrane pellucid, in parts slightly coriaceous, furnished with a rather irregular unispiculous network of short acerate spicula, of the same form and size as those of the skeleton, and also with numerous simple and contort bihamate retentive spicula. Skeleton-rete rarely more than unispiculous, somewhat irregular; spicula acerate, rather short and stout. Interstitial membranes furnished rather abundantly with very minute simple and contort retentive spicula.

Colour, in the dried state, pallid green.

*Hab.* Straits of Malacca (*Commodore Parish, R.N.*).

Examined in the dried state.

I received this interesting and elegantly constructed species of *Halichondria* from my friend Commodore Parish, who obtained it from the Straits of Malacca. The sponge is, in a great measure, covered by the specimen of *Microciona tuberosa* described in this paper. Its length is about  $2\frac{1}{2}$  inches, and its breadth about  $1\frac{1}{4}$  inch. The dermal membrane is smooth and pellucid, and it is furnished with a beautiful unispiculous rete, the areas of which are somewhat unsymmetrical. The reticulated structure of the skeleton accords very closely with that of the dermis: it is mostly unispiculous, but occasionally it is bi- or trispiculous, and is characterized by the same irregularities in the reticulation that exist in the dermal structure, so that the whole structure is light and elegant. The form and size of the spicula are the same in all parts of the sponge; they are rather short and stout. The retentive spicula of the dermal and interstitial membranes are especially characteristic of the species; they are rather abundantly distributed on some parts of those tissues and but sparingly so on others, and they are so minute as to require a power of about 400 linear to render them distinctly to the eye.

The nearest allied species to this sponge is our British *Halichondria couchii*. In size and external form they are very different from each other; but structurally, as regards the dermal and skeleton-tissues, they so closely resemble each other as to render it very difficult to separate them. Fortunately the abundance of bihamate retentive spicula in *H. elegantia* and their complete absence in *H. couchii* renders the discrimination of the two species easy and certain.

*HALICHONDRIA ASPERA*, Bowerbank.

Sponge massive, sessile; surface uneven and very rugged. Oscula simple, large and numerous, dispersed. Dermal membrane pellucid, abundantly spiculous; tension-spicula biclavate cylindrical, loosely fasciculated; and long and slender acerate, dispersed; retentive spicula bidentate equianchorate, stout and comparatively large, few in number; and the same form very minute and rather numerous; also bihamate, comparatively large and strong, few in number; and the same form very minute and slender and much more numerous. Skeleton-rete more or less multispiculous, rather regular; spicula short and stout, acute, occasionally subflexo-acute. Interstitial membranes sparingly furnished with the same tension- and retentive spicula as the dermal membrane.

Colour, in the dried state, pallid green.

*Hab.* Straits of Malacca (*Commodore Parish*).

Examined in the dried state.

I received this sponge among others from my friend Commodore Parish, who obtained it from the Straits of Malacca. It is  $2\frac{1}{2}$  inches long by 2 in breadth; and the thickness is rather more than an inch. Its form is very irregular, and its surface exceedingly rugged and uneven, abounding in minute ridges and asperities, so much so that it is difficult at the first sight to distinguish the oscula. The dermal membrane is abundantly furnished with spicula. There are two distinct forms of the tension ones; the most abundant of the two are the biclavated cylindrical ones, which are usually gathered together in loosely formed fasciculi of from two or three to six or eight; and a few of them are dispersed singly among the others. The fasciculi are disposed without any approximation to order. The second form of tension-spiculum is very slender acerate or fusiformi-acerate; they are longer than the biclavated cylindrical ones, but less in their greatest diameter, and they are distributed singly in considerable number among the others. The occurrence of two distinct forms of tension-spicula and two different modes of their distribution is very rarely seen in the dermal membrane of the same sponge, and thus it is very characteristic of the species. The retentive spicula are also very remarkable in this species. There are two distinct sorts of bidentate equianchorate ones, and also of bihamate spicula. The largest sort of bidentate equianchorate ones are more than twice the size of the smaller anchorate ones; comparatively they are stout and strong; but they are very few in number, while the smaller ones are comparatively numerous. A full-sized large one measured  $\frac{1}{1000}$  inch in length, while the average length of smaller ones was  $\frac{1}{2300}$  inch in length. The same difference in size exists between the two sorts of bihamate spicula. The largest sort measured  $\frac{1}{750}$  inch in length, while two of the smaller ones measured respectively  $\frac{1}{1500}$  and  $\frac{1}{1875}$  inch in length. They are also comparatively very numerous, while the larger ones are of very rare occurrence. No gradational sizes exist between the large and small forms of either the anchorate or bihamate spicula. The small

description of both of these organs require the application of a power of at least 400 linear to render them distinctly to the eye. Their minuteness is such that they do not exceed in length the diameter of a skeleton-spiculum,  $\frac{1}{1500}$  inch.

The skeleton-rete is strongly developed, and the spicula are comparatively short and very stout.

The nearest alliance to this sponge among our British species is *Halichondria forcipis*. Its general habit, the forms and modes of disposition of the spicula of the dermis, and the form and proportions of the skeleton-spicula exhibit close resemblances; but in other important characters the two species are essentially different.

#### HALICHONDRIA FRONDIFERA, Bowerbank.

Sponge branching from the base numerously; branches rather compressed, frequently dividing, distal terminations spinoid. Surface minutely rugose. Oscula simple, minute, dispersed. Pores inconspicuous. Dermal membrane abundantly spiculous; tension-spicula acuate, rather long and slender, dispersed; retentive spicula bidentate equianchorate, very minute and few in number. Skeleton-rete multispiculous, compact, rather close and strong, areas small; spicula acuate, rather stout and short. Internal defensive spicula attenuato-acuate, entirely spined, short and stout, uniform in size, rather numerous.

Colour, in the dried state, dull grey.

*Hab.* Straits of Malacca and Gaspar Straits (*Commodore Parish, R.N.*).

Examined in the dried state.

I am indebted to my friend Commodore Parish for this remarkable sponge; he obtained it with many others from the Straits of Malacca. It is attached to the shell of a small *Spondylus*, nearly the whole of the valve of which is covered by the thin basal portion of the sponge, from which numerous slender compressed branches are given off, some of them nearly two inches in length; each of these branches resembles in form a stag's horn, but with many more divisions than would be possessed by the horn. The oscula are simple and minute, a few only near the distal terminations of the branches being visible with the aid of a lens of two inches focus. The tension-spicula of the dermal membrane are exceedingly numerous, so much so as almost to present a felted appearance; they are quite as long as those of the skeleton, but not more than half their diameter. The bidentate equianchorate retentive spicula are very minute and slender, and very few in number: I could not detect them *in situ*; but amidst the spicula prepared by the action of nitric acid I found them on some of the fragments of the dermal membrane and a very few among the other spicula; one of the largest of them measured  $\frac{1}{2000}$  inch in length. They require a power of about 400 linear to render them distinctly to the eye. The attenuato-acuate, entirely spined, internal defensive spicula are uniform in size and rather numerous; they are based on the skeleton-rete, and

are projected at right angles to the fibre into the areas, frequently in considerable numbers; a power of about 300 linear is required to exhibit them *in situ* in a satisfactory manner; their length rarely exceeds  $\frac{1}{300}$  inch.

The acute skeleton-spicula are distinctly different in their proportions from those of the dermis; their diameter is twice that of the dermal ones. A full-sized one measured  $\frac{1}{2000}$  inch in diameter.

Since the above description was written I have examined another specimen of this species, sent to me from the Straits of Gaspar by Commodore Parish. It is, in its external and anatomical characters, very like the type one, but rather larger and more strongly developed. A remarkable circumstance attending this specimen is that it has two very interesting radiate animals seated upon it, the small or basal arms of which are so interwoven amidst the branches of the sponge as to render it impossible to disentangle them without the destruction of the radiate animals, while the larger and longer arms for entangling their prey are thrown out above in every direction. Their mode of anchoring themselves on the sponge is an interesting fact in their natural history.

#### HALICHONDRIA RIGIDA, Bowerbank.

Sponge massive, sessile. Surface very rugged and uneven, full of ridges and depressions. Oscula simple, dispersed. Pores inconspicuous. Dermal membrane pellucid, spiculous; tension-spicula acute, the same diameter and nearly the same length as those of the skeleton; retentive spicula bihamate, simple, and contort, rather numerous; and bidentate equianchorate, small, but rather stout, not numerous. Skeleton-rete multispiculous, very wide and open, irregular; areas very variable in size; spicula purely acute, rather short and stout. Interstitial membranes sparingly spiculous; spicula same as those of the dermis.

Colour, in the dried state, dull green.

*Hab.* Straits of Malacca (*Commodore Parish, R.N.*).

Examined in the dried state.

I obtained this sponge from my friend Commodore Parish. It is from the Straits of Malacca. It is  $2\frac{1}{2}$  inches long, 1 inch wide, and rather exceeds half an inch in average thickness.

The dermal membrane is rather sparingly furnished with tension-spicula. There is very little difference between these spicula and those of the skeleton; the latter are rather the longer of the two; their diameter is about the same. In consequence of the open structure of the skeleton-rete there are a considerable number of surreptitious spicula of various forms amidst the tissues of this sponge; and fragments of some of these are occasionally incorporated in the skeleton-fibre, as in a *Dysidea*. The spicula in the fibre are numerous and closely compacted, and the areas very wide, but by no means equal or regular in either form or size. The bihamate retentive spicula are not very abundant; they are rather slender; and the simple and contort forms are about equal in number, and

they are about as numerous on the interstitial membranes as on the dermal one. The bidentate equianchorate ones are rather rare; they are not readily found *in situ* amidst the numerous minute grains of sand adherent to the membranes; but they are readily found among the spicula prepared by the aid of nitric acid, but they require the application of a power of about 400 linear to render them distinctly to the eye; they are stout and short in their proportions.

The interstitial membranes are usually rather sparingly spiculous; but occasionally the spicula are clustered together in considerable quantities.

#### HALICHONDRIA CRASSA, Bowerbank.

Sponge massive, sessile. Surface uneven and very rugged, with numerous irregular thin ridges and elevations, coarsely reticulated. Oscula simple, dispersed. Pores inconspicuous. Dermal membrane spiculous; tension-spicula acuate, same size and form as those of the skeleton, not very numerous; retentive spicula, two descriptions of bihamate, simple and contort, large and small, and bidentate equianchorate minute, and few in number. Skeleton-rete multispiculous, coarse, and strong; areas large and irregular; spicula acuate, rather short and stout. Interstitial membranes spiculous; spicula same as those of the dermis.

Colour, in the dried state, dull pale green.

*Hab.* Straits of Malacca (*Commodore Parish*).

Examined in the dried state.

I received a single specimen of this sponge from my friend Commodore Parish, who obtained it from the Straits of Malacca. It is a rough-looking mass, very irregular in form, about  $1\frac{1}{2}$  inch in diameter, and half an inch in thickness, and it has several specimens of *Balanus* imbedded in its substance. Its surface is full of sharp, thin, elevated ridges and deep depressions; and all parts of its surface are coarsely reticulated, the reticulation being more or less visible to the unassisted eye, and very apparent by the aid of a lens of 2 inches focus. This coarse reticulation arises in the dried specimen from the very coarse and open character of the skeleton-structures immediately beneath the dermis.

The oscula are rather numerous; and some of them exceed a line in diameter. The dermal membrane is in some parts rather sparingly, and in others profusely, furnished with its respective spicula; the tension ones, like those of the skeleton, are purely acuate. Of the bihamate retentive spicula there are two distinct sizes—one comparatively large (that is to say, measuring on an average  $\frac{1}{6}\frac{1}{8}\frac{1}{2}$  inch in length), while the minuter set of these forms measured only  $\frac{1}{27}\frac{1}{27}$  inch in length. These minute forms could not be detected *in situ*; but in the remains of the membranes rendered transparent by the action of nitric acid and mounting in Canada balsam, and with a power of about 700 linear, they were distinctly visible. The bidentate equianchorate retentive spicula were also minute; they varied in length from  $\frac{1}{10}\frac{1}{34}$  inch to  $\frac{1}{8}\frac{1}{5}$  inch, and required a power of about 400

linear to define their forms distinctly; proportionately they were rather stoutly and strongly formed.

The structural peculiarities of the skeleton form a very striking specific character in this species. The rete is strongly and compactly formed, and the number of spicula in any part of it is far greater than can be counted. The areas are unsymmetrical and rather variable; and the interstitial membranes filling them are frequently abundantly supplied with the same description of spicula as those of the dermal one.

#### HALICHONDRIA COMPRESSA, Bowerbank.

Sponge branching irregularly and abruptly; branches compressed. Surface more or less rugose or spinous. Oscula simple, dispersed. Pores inconspicuous. Dermal membrane spiculous; tension-spicula subclavate acuate, variable in form, dispersed or more or less fasciculated; retentive spicula bidentate, rarely tridentate equianchorate, comparatively large and very stout, rather few in number; and the same form minute and slender, numerous. Skeleton-rete multi-spiculous, very irregular; areas large and variable in form; spicula acuate, rather short and stout. Interstitial membranes sparingly spiculous; spicula same as those of the dermis.

Colour, in the dried state, dark green.

*Hab.* Straits of Malacca (*Commodore Parish, R.N.*).

Examined in the dried state.

I received this remarkable sponge with others from my friend Commodore Parish, who obtained it from the Straits of Malacca. It is rather less than 2 inches in height, and less than an inch wide at its greatest expansion. The external form is remarkably singular. It rises from a very small base, and immediately branches abruptly in every direction and at every possible angle. The branches are nearly all of the same size, and are all more or less compressed, and their surfaces rough and irregular.

The dermal membrane is comparatively stout, and in most parts it is abundantly spiculous. The tension-spicula are occasionally sub-fasciculated, or so numerous as almost to appear felted together; while in others they are dispersed singly, and rather sparingly distributed, crossing each other at various angles. These spicula are subject to considerable variation in form: all of them are more or less subclavate at the base, but their shafts exhibit the greatest amount of variation; some are quite attenuato-acuate, while others terminate so obtusely as to closely approach the cylindrical form; and gradational forms between the two extremes are of frequent occurrence. The bidentate equianchorate retentive spicula also exhibit very remarkable characters. There are two very distinct sorts of them—one comparatively large and of very robust structure, the other very minutely slender and delicate; both have their shafts semicircular. The larger ones average  $\frac{1}{800}$  inch in length, with a diameter of shaft of  $\frac{1}{3000}$  inch; the smaller series never appear to exceed  $\frac{1}{1200}$  inch in length, and the shaft of one of the

largest of them measured  $\frac{1}{12000}$  inch in diameter. In these smaller ones there also exists another peculiarity; and that is that the terminal teeth are given off at nearly right angles to the axis of the shaft. These peculiarities of the tension and retentive spicula of the dermal membrane, combined with the eccentric and singular form of the sponge, afford excellent specific characters to discriminate this from any other nearly allied species.

*HALICHONDRIA VARIA*, Bowerbank.

Sponge massive, sessile, variable in form. Surface smooth or rough and rugged. Oscula simple, dispersed. Pores inconspicuous. Dermal membrane spiculous, reticulated; rete unispiculous; spicula acerate, stout, same size and form as those of the skeleton; retentive spicula bihamate, simple and contort, minute and slender, very numerous. Skeleton-rete compact, uni- or bispiculous; areas unsymmetrical; spicula acerate, short and stout. Interstitial membranes—retentive spicula bihamate, simple and contort, slender and minute, numerous.

Colour, in the dried state, dull ochreous yellow.

*Hab.* Straits of Malacca (*Commodore Parish*).

Examined in the dried state.

The external characters of this sponge are exceedingly variable. Sometimes it appears as a rough and irregular mass, full of small ridges and prominences; at other times it assumes the form of short cylindrical branches, with a surface comparatively smooth, and with the oscula well developed and evenly distributed. Notwithstanding these striking variations in form, the structural characters are exactly the same in every specimen. The most striking specific characters are exhibited in the dermal membrane, the unispiculous rete of which is a very beautiful object when mounted in Canada balsam. The rete is seldom more than one spiculum in width; and the areas vary to a very considerable extent in form; and the membranes filling the areas are in many cases crowded with the minute slender bihamate retentive spicula. These spicula are very small and slender, and require a power of about 300 linear to define them in a satisfactory manner. Their length does not exceed twice the diameter of a skeleton-spiculum.

The skeleton-rete is compact and strongly constructed, with but slight approaches to symmetry. The areas are very variable in form, and each side rarely ever exceeds one spiculum in length. The short stout acerate spicula of which it is formed are the same in length and form as those of the dermal rete. Within the mass of the sponge there are frequently to be seen interstitial cavities of comparatively considerable size; and in the lining membranes of these the minute bihamate retentive spicula abound to quite as great an extent as in the dermal membrane. I received several small specimens of this sponge from my friend Commodore Parish, who obtained them from the Straits of Malacca.



*HALICHONDRIA PURPUREA*, Bowerbank.

Sponge massive, sessile. Surface very rough and rugged. Oscula simple, dispersed. Pores inconspicuous. Dermal membrane spiculous; tension-spicula fusiformi-acuate, rather slender, longer than those of the skeleton, very numerous; retentive spicula bidentate equianchorate, very minute, equable in size, numerous. Skeleton—rete very coarse and open; fibre multispiculous, very stout and compact; spicula fusiform acuate, short and stout. Interstitial membranes spiculous; spicula same as those of the dermis, dispersed, numerous. Sarcodæ dark purple.

Colour, in the dried state, dark purple.

*Hab.* Straits of Malacca (*Commodore Parish*).

Examined in the dried state.

Among the sponges from the Straits of Malacca which I received from my friend Commodore Parish, there was a specimen of a *Sertularia*, on which there were four species of parasitical sponges located, and among them the one in course of description. It is a small mass about half an inch wide at the base, gradually decreasing in size, and terminating acutely at the height of  $1\frac{1}{4}$  inch, of a deep-purple colour. The surface is remarkably rugged, full of deep pits and sharp elevations. The dermal membrane is very characteristic of the species; it abounds in spicula; the tension ones are frequently nearly twice the length of the skeleton ones, while they are very little more than half their diameter. They are very numerous, in some parts forming flat wide fasciculi, and in others they are scattered indiscriminately over the surface of the membrane. The retentive bidentate equianchorate ones are also very characteristic; they are slender and delicate in form, very equable in size, and very minute; they do not exceed  $\frac{1}{1383}$  inch in length, or twice the diameter of a fully developed skeleton-spiculum, which measured  $\frac{1}{2515}$  inch in diameter. Nearly the whole of these spicula, seen *in situ*, were firmly attached to the surface of the membrane by the middle of the convex back of the shaft. They were very numerous on some parts of both the dermal and interstitial membranes. Occasionally a few also of the short stout skeleton-spicula were mingled with the tension-spicula of both the dermal and interstitial membranes.

The skeleton-structure is remarkably coarse and strong, the fibre containing a far greater number of spicula than is usual in skeletons of the genus *Halichondria*, and the areas are wide and irregular in their form. These peculiarities of structure seem to indicate that this species attains a much greater size than the specimen under description. The whole of the internal sarcodæ, as well as the external portions of the sponge, are of a dark purple colour.

*ISODICTYA RUDIS*, Bowerbank.

Sponge massive, sessile. Surface rugged and very uneven. Oscula simple, dispersed, numerous. Pores inconspicuous. Dermal membrane abundantly spiculous; tension-spicula acerate, long and slender, numerous, dispersed. Skeleton—texture coarse and irregular; pri-

mary lines multispiculous; secondary lines very irregular, mostly unispiculous, occasionally bi- or trispiculous; spicula acute, stout, and rather short. Interstitial membranes sparingly spiculous; spicula same as those of the dermis.

Colour, in the dried state, pale ochreous yellow.

*Hab.* Straits of Malacca (*Commodore Parish*).

Examined in the dried state.

The external characters of this species are by no means prepossessing. It is a rough and very uneven mass, 2 inches in length and about 1 inch in greatest diameter, full of ridges and depressions. Sections cut at right angles to the surface do not readily illustrate the characteristic structure of *Isodictya*, in consequence of the coarse and irregular nature of the skeleton; but on a more careful examination the presence of the stout continuous primary lines of the skeleton unmistakably lead us to a correct determination of the genus. The dermal membrane is very characteristic of the species. It is abundantly supplied with long, slender, acerate tension-spicula, irregularly distributed and crossing each other in every direction. These spicula are quite as long, and frequently longer, than those of the skeleton, while their diameter varies from half to one third of those of the last-named organs.

The skeleton-structure is very open and irregular, and the spicula in the primary fibres are very numerous; they are acute and comparatively stout and short. The secondary lines are very irregularly distributed and rather numerous; so that when a section of the sponge is hastily examined, it is very liable to be mistaken for that of a *Halichondria*.

I received this species from my friend Commodore Parish, who obtained it from the Straits of Malacca.

#### *ISODICTYA VIRGATA*, Bowerbank.

Sponge virgultose, more or less fistulous. Surface smooth. Oscula simple, dispersed, rather large. Pores inconspicuous. Dermal membrane spiculous; spicula acerate, same size and form as those of the skeleton, reticulated; rete rarely more than unispiculous or bispiculous, areas irregular in form; retentive spicula bihamate, simple, and contort, rather numerous, minute. Skeleton diffuse and irregular; primary lines multispiculous, spaces between them varying from one to two spicula in width, rarely wider; secondary lines bi- or trispiculous, irregular. Interstitial membranes furnished abundantly with minute simple and contort bihamate retentive spicula, same as those of the dermis.

Colour, in the dried state, pale ochreous yellow.

*Hab.* Straits of Malacca (*Commodore Parish*).

Examined in the dried state.

This sponge consists of two short branches based on a small fragment of stone or coral; the tallest of the two does not exceed 2 inches in height, and about 2 lines in diameter; for a portion of its length there is a central fistulous cavity, but it does not appear at the

distal extremities of the branches. The skeleton-structure of this species appears to be very irregular; but the well-produced primary lines of the skeleton unmistakably stamps it as an *Isodictya*. The rete of the dermal membrane is more or less irregular, and is, with its retentive spicula, very characteristic of the species. Its areas frequently exceed in width the length of a spiculum, and they vary to a considerable extent in form. The retentive spicula within them are in some of them rather numerous, while in others they are very sparingly distributed; they are very minute and slender, requiring a power of about 500 linear to render them distinctly to the eye. In the interstitial membranes the retentive spicula are very much more numerous than they are in the dermal one; and they are especially so in the linings of the fistulous cavities.

It is very probable that hereafter this species will be found to attain a much greater altitude than the specimen in course of description. I am indebted to my friend Commodore Parish for my knowledge of it. He obtained it from the Straits of Malacca.

#### DESMACIDON FOLIOIDES, Bowerbank.

Sponge ramous, branches inosculating. Surface smooth, but more or less spiniferous. Oscula simple, dispersed. Pores inconspicuous. Dermal membrane pellucid, spiculous, furnished with a leaf-like reticulation of minute acerate spicula. Skeleton—reticulating fibres compact and strong; areas wide and irregular. Spicula acerate, rather small and short. Interstitial membranes spiculous; tension-spicula dispersed, same form and size as those of the dermis.

Colour, in the dried state, dull ochreous yellow.

*Hab.* Straits of Malacca (*Commodore Parish*).

Examined in the dried state.

This sponge and a small specimen of *Geodia carinata* are based together on a little sandy mass; they are so closely incorporated, and so nearly resemble each other in size, colour, and form, as to be readily mistaken by a hasty observer for one species only. The sponge-stem has an irregular expansion of  $4\frac{1}{2}$  inches length, and has an average diameter of about 4 lines; one portion of the branches is comparatively smooth, while another portion abounds in spinous projections.

The most strikingly distinctive character in this sponge exists in the dermal membrane. When a portion of it is mounted in Canada balsam and viewed with a linear power of about 100, it exhibits an appearance exceedingly like that of a portion of the skeleton of a macerated leaf of *Populus nigra*. There are a series of veins or long fasciculi composed of numerous minute acerate spicula meandering for considerable lengths on the inner surface of the membrane; and the spaces between each of these are occupied by a very delicate uniserial network of minute spicula, simulating in a remarkable manner the leafy skeleton. The skeleton-rete is very open and irregular, and the fibre of which it is composed is very closely compacted; the acerate spicula of the skeleton are very much larger

than those of the dermal membrane; but the whole of the spicula are rather small, requiring a power of about 300 linear to render their forms and proportions distinctly.

The interstitial membranes are abundantly supplied with acerate spicula irregularly dispersed, and of the same size as those of the dermis. I am indebted to my friend Commodore Parish for this interesting species. He obtained it from the Straits of Malacca.

*DESMACIDON VENUSTA*, Bowerbank.

Sponge sessile, fistulous; fistulæ comparatively large and open. Surface smooth and even. Oscula simple, within the fistulæ. Pores inconspicuous. Dermal membrane pellucid, abundantly spiculous, reticulated; rete unispiculous, very regular and beautiful; areas mostly triangular, rarely quadrangular; spicula acerate, short and stout, same size as those of the skeleton. Skeleton-rete very diffuse and irregular; fibres slender and compact; spicula small, short, and stout. Interstitial spaces filled with beautiful masses of unispiculous reticulated structure; spicula same as those of the fibrous skeleton; areas same size and form as those of the dermal membrane.

Colour pale ochreous yellow in the dried state.

*Hab.* Straits of Malacca (*Commodore Parish*).

Examined in the dried state.

This sponge consists of four short stout fistulæ, not quite an inch in height, the whole mass averaging about  $1\frac{1}{2}$  inch in breadth, and the parietes of the fistulæ are about  $\frac{1}{8}$  of an inch in thickness. The structural peculiarities of the dermal membrane, when a small portion of it is mounted in Canada balsam and viewed with a power of about 100 linear, are remarkably regular and beautiful, and especially characteristic of the species. The rete consists of an elegantly symmetrical network of single spicula, with nearly the whole of the areas of a triangular form, a quadrangular one being of rather rare occurrence; and as the component spicula are very equal in their lengths and diameters, the result is a remarkable degree of symmetry and beauty. The whole of the interstitial spaces within the fibrous skeleton are filled with masses of a similarly regular and beautiful unispiculous reticular structure, closely simulating that of the dermal structure; and amidst this beautiful tissue the long, slender, fibrous skeleton meanders in various directions. Although the structural characters of this species are few and simple, the regularity and beauty of the modes of their disposition afford excellent specific characters for its identification. The only species of *Desmacidon* with which it might possibly be confounded is *D. folioides*, from the same locality; but, independent of the differences of external form, the last-named species differs in the dermal membrane being furnished with the peculiar leaf-like arrangement of its rete, and in the interstitial spaces; the spicula are only sparingly dispersed on the membranes. In both species the spicula are of about the same length; but those of the species in course of description are twice the diameter of those of *D. folioides*.

3. On the Form of the Trachea in certain Species of Storks and Spoonbills. By A. H. GARROD, B.A., F.Z.S.,  
 Prosector to the Society.

[Received March 15, 1875.]

No account of the peculiarities of the windpipe in *Tantalus ibis* and in *Platalea ajaja* has yet, to the best of my knowledge, appeared in print. They cannot but interest ornithologists; I therefore append descriptions of them from specimens which have passed through my hands as Prosector to the Society.

In the Transactions of the Linnean Society\* there is a paper by Mr. Joshua Brookes, F.R.S., "On the remarkable Formation of the Trachea in the Egyptian *Tantalus*." The author does not mention the sex of his specimen, and does not refer to the existence of any intrathoracic or any other loops; he draws attention only to the existence of a lateral compression of the portion of the trachea which is contained within the thorax; and he incidentally refers to the similarity of the arrangement of the windpipe in the Spoonbill and *Tantalus ibis*, but does not hint at the points in which they agree.

In most species of Ciconiidae the only peculiarity of the windpipe is that the bronchi are longer than in other birds, the bifurcation of the trachea occurring at, or even a little above, the superior aperture of the thorax. This condition I have observed in the female *Ciconia boyciana* which died on January 15th, 1874, as well as in examples of *C. maguari* and *C. alba*. In the male of *C. nigra* the bronchi are known to be peculiarly long†, and to form an  $\infty$ -shaped curve entering the lungs. No other peculiarities have been described among these birds.

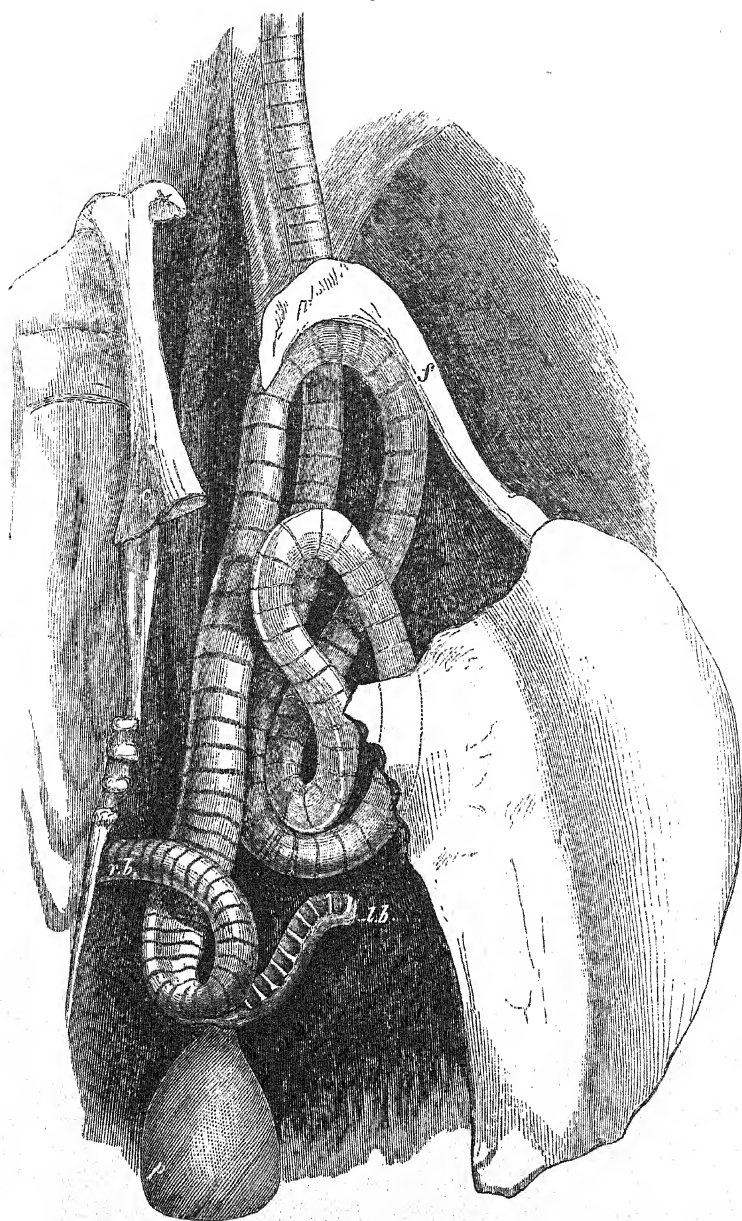
A specimen of *Tantalus ibis* was purchased by the Society on the 26th of May, 1873, which died on the 12th of March, 1875. It proved to be a male. The following is the arrangement of the convolutions of its trachea (see figure, p. 298). The windpipe descends the neck in front of the œsophagus without any peculiarities being observable, the rings which go to compose it being exactly like those of other allied birds, circular, complete, elastic, notched in the middle line before and behind, and of ordinary depth. Directly it reaches the superior aperture of the thorax, between the two rami of the furcula, a sudden change occurs. The succeeding rings are inelastic, from being ossified; and they are ossified together in pairs, so that their apparent depth is more than double that of the cervical rings, the intermediate membrane being included in the double rings. The depth of the unmodified rings is hardly more than  $\frac{1}{12}$  of an inch, that of the intrathoracic modified ones being as much as  $\frac{1}{4}$  of an inch. The diameter of both is about  $\frac{1}{3}$  of an inch; those in the chest are further peculiar in developing a slight median longitudinal ridge along their posterior surface.

The two *musculi depressores tracheæ*, after running down the

\* Vol. xvi. p. 499.

† Naumann's Naturgeschichte der Vögel Deutschlands, vol. ix. p. 229.

Fig. 1.



Intrathoracic convolutions of the trachea in *Tantalus ibis*.

c. coracoid; f. furcula; p. proventriculus; r.b. right bronchus; l.b. left bronchus; st. sternum.

windpipe as long as it is in the neck, leave it together as it enters the chest to run to their insertions behind the sternal articular ends of the second complete ribs, the left one crossing in front of the upper of the two loops described below. There are no special lateral muscles running to the syrinx.

The trachea, modified in the manner above described, continues its normal course downwards as far as a horizontal plane cutting the base of the heart, when it makes a fairly gradual turn through half a circle, directly forward, to consequently ascend with the posterior keel above mentioned, running along the middle of its convex surface. On reaching the level of the symphysis furculæ it makes a second semicircular turn to the right, to again descend nearly as far as on the former occasion, and making a third similar turn to the left whilst in the fold of the first loop, ascends a third time as high as the line joining the two sides of the furcula—in other words, to the very top of the thoracic cavity. Here it turns backwards to descend again, in contact with the first part of the intrathoracic tube, to its right side, as far as the level of the apex of the heart and the commencement of the proventriculus; where, making a short very abrupt turn forwards, it bifurcates into the two bronchi, which therefore, uniquely, run from their origins upwards and outwards to their respective lungs. In this third and last descending portion of the windpipe, which has a length of  $5\frac{1}{2}$  inches, the lower 3 inches are considerably flattened in what would be the lateral direction, which, through the convolutions it has been called upon to make, is twisted, so that the flattening appears to be nearly antero-posterior, the median ridge, developed posteriorly, being placed considerably on the right side.

About an inch above this flexure, in which the bronchi bifurcate, the previously deep double rings suddenly cease to be developed as such, and return to their normal condition just before the peculiarly situated and simple syrinx is reached.

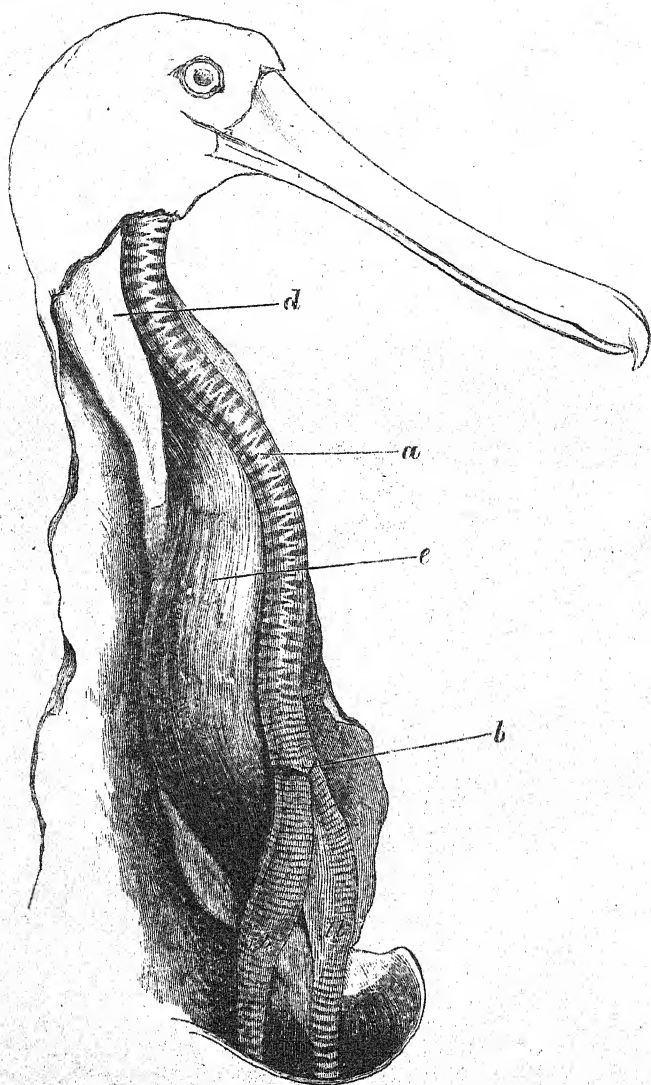
There are altogether 82 of the ossified double rings in the modified portion of the windpipe.

The earlier bronchial rings are peculiar in being deep, the fibro-cartilaginous rings being ossified and thickened above and below for a certain portion (the external) of their circumference.

*Platalea ajaja*.—The peculiar convolution, within the thorax, of the trachea in *Platalea leucorodia* is well figured by Mr. Yarrell\*. The arrangement in *Platalea ajaja* is, however, quite different. A pair of these birds was purchased by the Society on the 13th of August, 1870. The female dying on the 27th of July, and the male on the 13th of October, 1873, have given me the opportunity of examining the windpipe in both sexes. The trachea is simple, straight, of uniform calibre, and peculiarly short, extending only two thirds down the length of the neck, where the uncomplicated syrinx is situated and the bifurcation of the bronchi occurs. The usual pair of muscles, one on each side, runs to this syrinx from above, and ceases there. The bronchi are fusiformly dilated at their commence-

\* British Birds, vol. ii. p. 504.

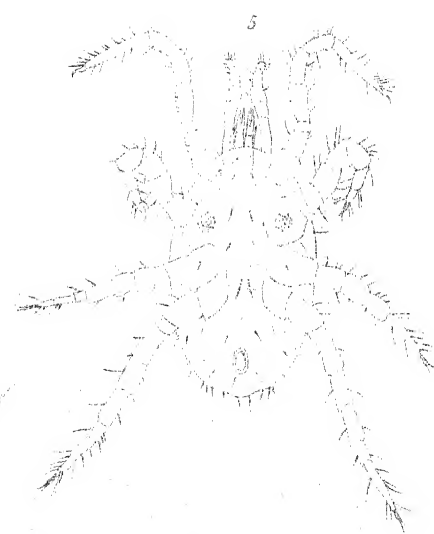
Fig. 2.

Cervical bifurcation of the bronchii in *Platalea ajaja*.

*a*, trachea; *b*, syrinx; *d*, esophagus; *e*, cervical muscles and vertebrae;  
*r.b.*, right bronchus; *l.b.*, left bronchus;



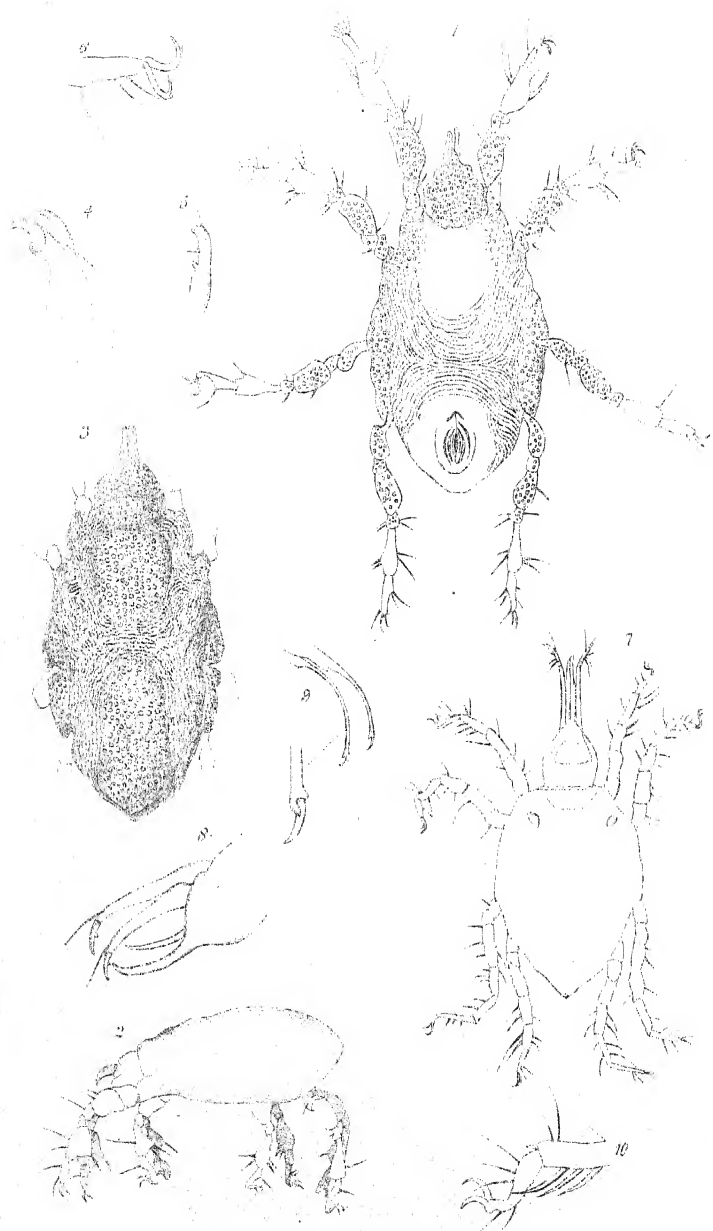




Hollick del.

MacKinnon imp.





ment, where the rings which encircle them are not complete, a membrane taking their place in that portion of each tube which is contiguous to its opposite neighbour. Each bronchus, lower down, is composed of complete cartilaginous rings (*vide* fig. 2, p. 300).

By many ornithologists *Tantalus* is arranged along with *Platalea* and *Ibis*, instead of with the Storks. Nitzsch, in his 'Pterylography,' places it with *Ciconia* in his group PELARGI, separating off *Platalea* and *Ibis* to form the HEMIGLOTTIDES. In the "Revised List" of the Animals in the Society's Gardens, Mr. Selater adopts the same arrangement. In my paper "On the Nasal Bones of Birds" \*, it is mentioned that *Platalea* and *Ibis* are schizorhinal—that is, have the external osseous nares split up in a manner there described, in which point they differ from the rest of Prof. Huxley's Pelargomorphæ, and therefore from *Tantalus*.

There are many other structural peculiarities which make it perfectly certain that *Tantalus* is a member of the Ciconiidae; and not an aberrant one either. Some of the most important it will not be out of place to mention here. They will be most easily appreciated in a tabular form, as thus represented :—

In *Ibis* and *Platalea*.

The skull is schizorhinal.

The angle of the mandible is produced and recurved.

The *pectoralismajor* muscle is simple, not being separable into distinct layers.

The *accessory femoro-caudal* muscle is well developed.

The *semitendinosus* muscle is muscular throughout.

A small muscular belly is sent from the *biceps cubiti* to the tendon of the *tensor patagii longus* muscle.

In *Ciconia* and *Tantalus*.

The skull is holorhinal.

The angle of the mandible is truncated.

The *pectoralis major* muscle is in two layers, a superficial and a deep, easily separable one from the other.

The *accessory femoro-caudal* muscle is absent.

The *semitendinosus* muscle is tendinous for its distal half.

No slip leaves the *biceps cubiti* muscle to join the *tensor patagii longus*.

4. A Review of the British Marine Mites, with Descriptions of some new Species. By GEORGE STEWARDSON BRADY, C.M.Z.S.

[Received March 16, 1875.]

(Plates XLI. & XLII.)

The marine Mites hitherto described either by British or foreign authors are very few in number; and the descriptions seem for the most part to have been based on the observation of but few individuals, often only one or two for each species. The animals have

\* P. Z. S. 1873, p. 33.

usually been detected creeping on the stems of seaweeds or zoophytes or on the sides of marine aquaria; and to catch them in this fashion has doubtless the great advantage of presenting the creatures alive, so that their motions and habits, as well as the anatomical details of such delicate organs as those of the mouth, which are of course in active operation during life, may be more readily observed. My own knowledge of the Mites however, is, derived almost entirely from the examination of dead specimens; for though I have often found them living plentifully under stones and in the crevices of rocks on the sea-shore, the method of capture which I adopt has always killed them. The little animals are very active, running with great agility; and as a sudden nip of the forceps would most likely mutilate them so much as to render them useless for examination, I have usually when collecting dropped a little spirit from a full camel's hair pencil over the retreating speck and so brought its movements to a stand-still for a time sufficient to allow of his imprisonment: possibly if put into sea-water at once he might in some cases recover the temporary shock of the spirit bath, inasmuch as I have seen one species (*Pachygnathus seahami*) retain its vitality even after an immersion of many hours in a pretty strong arsenical solution, and I have also noticed that two or three drops of proof spirit does not always suffice to arrest the movements of the *Acari* over stones or seaweed. The great majority of my specimens, however, have been obtained from the washings of material dredged in depths of several fathoms, and have not been observed until after prolonged immersion (in spirit) and death.

In some dredgings made off the coasts of Durham and Yorkshire, the number of individuals was very considerable, almost leading one to the belief that they must in favourable spots colonize the mud almost as thickly as their better-known relatives a decaying cheese.

The only British naturalists who have written on the marine Mites are, so far as I know, Allman, Gosse, and Hodge.

The first-named author described a species (*Halarachne hali-chæri*) parasitic in the nostrils of a Seal. Mr. Gosse, in the 'Annals and Magazine of Natural History,' described and figured, with his characteristic accuracy and fidelity, three species, *Halacarus rhodostigma*, *H. ctenopus*, and *Pachygnathus notops*. More recently Mr. Hodge named and described, in the 'Transactions of the Tyneside Naturalists' Field Club,' species which he believed to be new, but some of which must, I fear, be considered spurious; his species were *Pachygnathus seahami* and *P. minutus*, *Leptognathus falcatus*, *Halacarus granulatus* and *H. oculatus*. I have myself taken all these in greater numbers than fell to the lot of Mr. Hodge, and have likewise been able to examine the type specimens, which, with the rest of his collection, are now preserved in the Newcastle Museum. The additions which I have been able to make in this paper are the following:—*Trombidium fucicolum*, *Pachygnathus sculptus*, *Gamasus marinus*, and *Cheyletus robertsoni*.

Mr. Gosse mentions that Fabricius has described two Norwegian marine mites, *Acarus zosterae* and *A. fucorum*; but these seem to

be distinct from any thing at present known to us in Britain. The same author says also, on the authority of M. Paul Gervais, that M. Dujardin "had described a marine *Oribates* in the 'Journ. de l'Institut,' for 1842," but he was unable to verify the quotation.

Besides these, the only marine Acari of which I have found notices are *Thalassarachna verrilli*, described by Dr. A. S. Packard in the 'American Journal of Science and Arts,' vol. i. 1871, and *Pontarachna punctulatum*, Philippi, in Wiegmann's 'Archiv,' vol. vi. p. 191, 1840, pl. iv. figs. 4, 5.

I have not thought it necessary to reproduce *in extenso* the descriptions of previously known species, but have contented myself with noting their more important characters, combining my own observations with those of prior authors.

### Class ARACHNIDA.

#### Order ACARINA.

#### Fam. TROMBIDIADÆ.

#### Genus TROMBIDIUM, Fabr.

##### TROMBIDIUM (?) FUCICOLUM, nov. sp.

Length  $\frac{3}{8}$  of an inch: colour very dark brown, opaque; body tumid, tapered and pointed in front, broadly rounded behind, produced laterally into two angular promontories at the origins of the first and second pairs of legs; surface corrugated. Mandibles consisting of two triangular plates (?) opposing each other in the median line; palps small, obtuse, 4- or 5-jointed, the penultimate joint bearing a small appendage something like an obsolescent unguis. Thighs not distant, all the pairs of legs having origin toward the front of the body. Legs 5-jointed, stout, opaque; second and fourth joints much the longest, first and third shortest; last joint terminating in three falciform claws, one of which is more slender than the rest, bearing near the extremity of the inner margin two short and stout spines, and beset with several (10-12) long slender hairs.

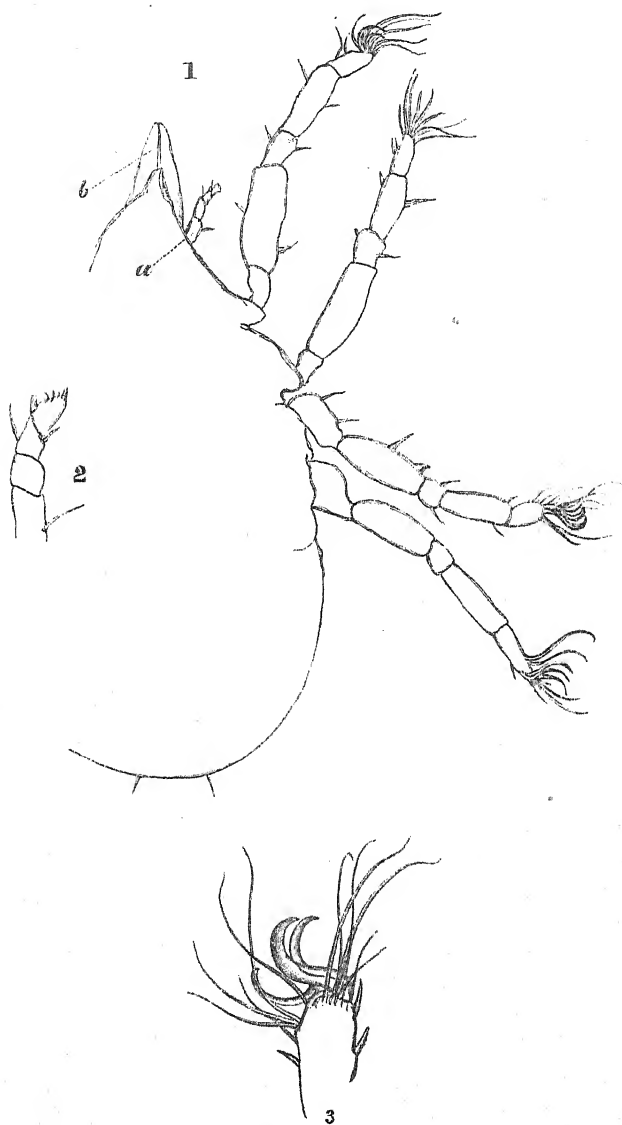
One adult and one young specimen of this species were washed from among the roots of *Algæ* gathered between tide-marks in Roundstone Bay, Ireland, by Mr. David Robertson. I am not sure that it is rightly referred to the genus *Trombidium*; but it seems to agree with Dugès's definition in most respects. The animal was so much mutilated in the process of examination that I have not been able to give a perfect figure, nor have I succeeded in getting a satisfactory view of the mouth-apparatus.

#### Genus PACHYGNATHUS, Dugès.

PACHYGNATHUS NOTOPS, Gosse, Ann. & Mag. Nat. Hist. ser. 2, vol. xvi. (1855), pl. 8. figs. 1-4.

"Body flat, sinuated, pointed behind, black; one eye on the back; legs equal, the first and second remote from the third and fourth, hairy; the last joint the longest.

"Length  $\frac{1}{8}$  of an inch. Body lozenge-shaped or somewhat 7-



*Trombidium fucicolum.*

- Fig. 1. Right half of animal, magnified about 100 diameters. *a*, palp; *b*, mandibular plates.  
 2. Palp, more highly magnified.  
 3. Extremity of foot, more highly magnified.



sided, with sinuations at the origin of the limbs; it is hyaline and colourless at the margins; but the interior is almost filled with a flesh of deep blue-black hue, perfectly opaque, and of defined, sub-regularly sinuous outline. In the centre of the back, just behind the head, is a bright ruby-like round eye, placed in front of the opacity and between the first legs.

"The head, formed by a great lip, projects in front and carries two small palpi, thick at the base, conical and pointed. Below, the lip is divided longitudinally, each half being slightly incurved and pointed, the two divisions approaching in a pincer-like manner. Under slight pressure there were projected between the palpi two slender styles, which doubtless represent the mandibles; and hence I am not sure whether the species should not range under the genus *Raphignathus* of Dugès.

"The legs are about equal and alike; the fourth and sixth joints are large and swollen; the seventh is the largest and tapers abruptly at the middle like a claret-bottle; the tip forms a little round disk, whence diverge a pair of curved hooks, with plain edges, but two-toothed at the tip, or rather having a prominent tooth over the tip.

"All the joints are well furnished with straight bristles, the sixth having one much longer and stouter than the rest. The limbs are set in two series, the first and second originating close together, but remote from the third and fourth, which are also contiguous to each other."

Not having seen any undoubted specimen of this species, I have transferred Mr. Gosse's description, which was drawn from specimens taken at Ilfracombe.

Mr. Norman notes it as being "abundant on weeds in rock-pools, Balta Sound, Shetland."

*PACHYGNATHUS SEAHAMI*, Hodge, Trans. Tyneside Nat. F. C. vol. iv. p. 319, pl. xvi. figs. 1 *a*, *b*, *c*.

This species agrees in every respect with the foregoing, except in the structure of the claws, which are angularly bent and finely cilio-pectinate on the inner margin. It may perhaps be doubted whether it ought to rank as a distinct species, though Mr. Gosse appears to have been disposed to think so, after having seen Mr. Hodge's specimens. The type specimens were taken on the Durham coast; and I have myself found it plentifully on weeds between tide-marks at Sunderland, in the Scilly Islands, and on the west coast of Ireland.

*PACHYGNATHUS MINUTUS*, Hodge, Trans. Tyneside Nat. F. C. vol. iv. p. 301, pl. xvi. figs. 10, 11.

Length  $\frac{1}{90}$  of an inch: colour reddish brown; shield truncate at insertion of first legs. Rostrum a stout bulb, tapering abruptly, and terminated by two lip-like organs; legs short and stout, the third and fifth joints swollen, sixth tapering abruptly and terminating in two falcate claws, which have a small tooth on the outer edge; between the claws a small hook. Eye single, situated behind the rostrum. Body minutely corrugated and pitted. Legs three pairs.

The single specimen on which Mr. Hodge founded this species was taken on a stem of *Coryne eximia* from between tide-marks; and there can be little doubt, from the fact of its possessing only three pairs of legs, that it is merely the young of some other species. The specimen, moreover, which is now in the Museum of the Natural-History Society at Newcastle-upon-Tyne, has in other respects the appearance of immaturity, the surface-markings and different areas of the body being very imperfectly defined. I strongly suspect that it may prove to be an early stage of the following species.

*PACHYGNATHUS SCULPTUS*, nov. sp. (Plate XLII. figs. 1-6.)

Length  $\frac{1}{15}$  of an inch: colour reddish brown. Body oblong-ovate, deeply indented at the origin of the limbs. The head forms a wide bulbous projection, from which springs a rather short and thick mucronate rostrum. The mandibles and palps are both poorly developed, the latter being short, thick, and terminating in small claws, the former consisting each of a short, slightly curved stem, which is furnished with two small setæ and a wart-like tooth on the concave margin. The two hinder pairs of legs are rather longer and more slender than the rest; thighs distant, being inserted near the margins of the body; second and fourth joints of the legs very small and constricted; third and fifth (especially in the first two pairs) larger and much swollen; first joint small in the two anterior pairs, rather longer in the two posterior; last, or sixth, joint of moderate length, suddenly tapering from the middle and terminating in two falcate claws, each with a small tooth on its convex margin. The dorsal surface of the body is mapped out into several distinct areas, characterized by pitted and corrugated systems of sculpture: the head and rostrum form an area bounded by a convex line, which stretches between the origins of the first pair of feet: immediately behind, and separated only by a lateral indent, is a subquadrate plate, broad in front and rather narrowed at its posterior extremity, which coincides with the middle of the body; behind this plate again, and separated from it by a narrow isthmus of corrugated epidermis, comes another elongated shield-shaped plate, which stretches quite to the hinder extremity of the body, increasing in width posteriorly: these three areas are all covered with closely set circular pittings, and are divided from each other by spaces of wrinkled epidermis, the lines of which are somewhat waved and irregular, but run generally in a concentric manner round the dotted shields: on the lateral aspects of the body also are two pitted areas, one vaguely defined and embracing the origins of the first and second pairs of legs, chiefly on the inferior surface of the body, the other having very distinct boundaries and extending almost equally on the upper and lower aspects of the body, from midway between the second and third pairs to the origin of the fourth pair of legs. The ventral surface of the body is chiefly corrugated, the head, however, being distinctly pitted as on the dorsal aspect; a space corresponding with the dorsal thoracic shield has no perceptible

sculpture, as also a similar space situated posteriorly and surrounding the anus. The first, second, third, and fourth joints of the legs are also marked with pitted sculpture.

Several specimens of *P. sculptus* were dredged in 25–35 fathoms, in various localities off the coasts of Durham and North Yorkshire.

### Genus RAPHIGNATHUS, Dugès.

(*Leptognathus*, Hodge.)

RAPHIGNATHUS FALCATUS (Hodge). (Plate XLII. figs. 7–10.)

*Leptognathus falcatus*, Hodge, Trans. Tyneside N. F. C. vol. v. p. 302, pl. 16. figs. 6, 7.

Length  $\frac{1}{8}$  of an inch: colour orange-brown. Body truncate above insertion of first legs. Head forming a broad subtriangular bulbous projection, from the front of which stands out a long, slender, bifid rostrum, between the valves of which, by pressure or dissection, may be discovered two slender, curved, unguiculate and protrusile mandibles. Palps very long and slender, extending beyond the tip of the rostrum, and bearing towards the extremities a few fine setæ. Legs of moderate and nearly equal length; the joints not much differing in size, except the last, which is long, thin, and terminated by two simple claws; thighs remote. Eyes three, one behind the base of the head, the others near the origin of the second pair of legs. Upper surface of the body divided by delicate furrows or striæ into four symmetrically arranged areolæ—two lateral, one anterior, and one posterior.

I have not been able thoroughly to satisfy myself as to the anterior eye spoken of by Mr. Hodge. I can find no trace of it in his type specimen; but I think I can detect something like it in one of my own. However, Hodge's description is so circumstantial that I conclude it must have been plainly visible in the fresh state of his specimen. I think there can be little doubt that the species is properly referable to the genus *Raphignathus* of Dugès.

Mr. Hodge's specimens were taken on the Durham coast in depths of from 20 to 30 fathoms. Several examples have been more recently dredged by Mr. David Robertson and myself on the same coast and also amongst the Scilly Islands in a depth of 10–12 fathoms.

### Fam. GAMASIDÆ.

#### Genus GAMASUS, Latreille.

GAMASUS MARINUS, nov. sp. (Plate XLI. figs. 5–7.)

Length  $\frac{1}{2}$  of an inch: colour yellowish brown. Body regularly oval, beset with scattered hairs; thighs contiguous, springing from near the median line. The palpi are large and thick, 6-jointed, obtuse, recurved at the extremity, the last joint thickly beset with rather long hairs: the mandibles are (in the adult) longer than the palps, and end in two strong denticulated nipping-claws like those of the hand of a lobster; externally, between them and the palps,

there is a styliform appendage (fig. 6, *b*). The first three pairs of legs are of nearly equal length, the last pair distinctly longer, all gradually tapering from the base and having subequal joints, except the third and penultimate joints, which are short, and the last, which is long, slender, and tapering, and terminates in two delicate claws. The limbs, as well as the body, are beset with stout hairs, the last joints of the legs being rather thickly tufted. Eyes two, lateral, at the base of the second pair of feet.

There is a good deal of diversity in the proportions and development of the mandibles and palps in different individuals of this species, probably dependent upon age (or sex?). The more highly magnified figure (fig. 6) seems to me to belong probably to the adult, while the state of the parts shown in the drawing of the entire animal (fig. 5) may be supposed to be characteristic of youth. In some specimens the lower joints of the legs are liable to run out into irregular subspinous processes.

*G. marinus* occurs pretty commonly in crevices of magnesian limestone rocks, between tide-marks, near Sunderland; and I have a specimen which was washed from amongst the roots of Algæ dredged off Cumbræ in the Frith of Clyde.

#### Genus CHEYLETUS, Latreille.

##### CHEYLETUS ROBERTSONI, nov. sp. (Plate XLI. figs. 1-4.)

Length  $\frac{1}{10}$  of an inch; pellucid, smooth, almost colourless. Body broadly ovate, constricted in front of the origin of the first pair of legs, the head and rostrum forming a triangular prominence, the lateral angles of which are much produced; from the front of these angles spring two very tumid, imperfectly jointed palps, which reach beyond the tip of the rostrum, and terminate in a large curved claw and several long setæ, two of which are beautifully pectinated on their inner margins with long, tooth-like cilia: the swollen base of the palp bears a single long hair, which reaches much beyond the point of the terminal claw. The rostrum consists apparently of two opposing triangular plates, from the tips of which spring two small setæ. The two hindmost pairs of legs are of nearly equal length, the second somewhat shorter, all bearing a few long scattered hairs, and having long and slender terminal joints which are armed with delicate, doubly curved claws (figs. 3 and 4). The legs of the first pair are much longer and more slender, antenniform, the joints gradually tapering and increasing in length from first to last: the thighs are moderately remote. Two long lateral hairs spring from near the middle of the body between the second and third pairs of legs; and there are two lateral tufts of three hairs each near the posterior extremity.

One specimen only of this remarkable mite was dredged off Hawthorn, on the Durham coast, in a depth of 27 fathoms. I have named it after my valued friend Mr. David Robertson of Glasgow, who was my companion on the dredging-expedition when it was taken. The mouth-organs are so like to those of *Cheyletus erudi-*

*tus*, Latreille, as figured by Dr. Johnson in his monograph of the Acarides of Berwickshire\*, that I cannot doubt the propriety of referring it to the same genus.

Genus HALARACHNE, Allman.

*Halarachne halichæri*, Allman, Ann. & Mag. Nat. Hist. vol. xx. 1847, p. 47.

Parasitic in the posterior nares of a Seal (*Halichærus gryphus*).

Fam. ORIBATIDÆ.

Genus HALACARUS, Gosse.

*HALACARUS RHODOSTIGMA*, Gosse, Ann. & Mag. Nat. Hist. ser. 2, vol. xvi. (1855), pl. 3. figs. 1-5.

*Halacarus granulatus*, Hodge, Trans. Tyneside Nat. F. C. vol. v. p. 299, pl. 16. figs. 4, 5.

*Halacarus oculatus*, Hodge, Trans. Tyneside Nat. F. C. vol. v. p. 300, pl. 16. figs. 8, 9.

"Body divided above and below; claw of palpus slender, little curved; legs nearly equal; thighs of first pair ventricose; claws all simple; whole surface minutely punctured.

"Length  $\frac{1}{2}$  of an inch from anus to tip of rostrum: colour pellucid whitish, stained with pale red on the anterior half; above and below studded with punctures, which under a high power take the form of rosettes or the spots on a panther's coat; the punctures are conspicuous on the first thighs, but are scarcely visible on the other limbs; the haunches are moderately distant at their origin, springing from the margin of the body, the shield being notched to give them exit; the third joint of the legs is the largest, much swollen in the first pair; the fifth is also large; and the sixth is long but slender, tapering abruptly from the middle; the claws are simple hooks, much curved, neither pectinated nor tipped with an accessory piece, but the joint from which they spring is tipped with two nearly parallel styles: the legs are equal in length.

"The shield of the body above is subtruncate in front, but projects in a small median point, long-oval, with a transverse sulcus at the origin of the second legs. Below, the body has two transverse divisions—one at the origin of the first legs, another at the origin of the third.

"The rostrum forms a thick bulb, tapering to a point, from which, during life, I observed two apparently soft, flexible, filiform, divergent organs (mandibles?) protruded and retracted. Palpus of four joints, of which the second is by far the largest; terminal joint slightly curved, pointed, and furnished near the base with two strong bristles on the inner side and one on the outer. All the joints of the legs are armed with a few short bristles. The vulva occupies a large oval area at the hind part of the venter; and the anus is terminal."

\* 'Transactions of the Berwickshire Naturalists' Field-Club, vols. ii. & iii.

The foregoing description (though not copied *verbatim*) comprises all the more important particulars noted by Mr. Gosse; and, allowing considerable margin for individual variation, it applies perfectly well to such examples of the species as have come under my notice. Mr. Gosse found it not uncommon among seaweeds from low-water mark at Weymouth; Mr. Hodge dredged it in a depth of 20 fathoms off the Durham coast; I have myself taken it abundantly in pools of brackish water at the side of the Burn, Seaton Sluice, Northumberland, and have also found it in great numbers in almost all dredgings from the coasts of Durham and Yorkshire, as well as in the Frith of Clyde.

It is with no little regret that I feel quite unable to draw any specific distinction between the forms described by my old friend Mr. Hodge (*H. granulatus* and *H. oculatus*) and the prior species *H. rhodostigma*, Gosse. *H. oculatus* is, I think, without doubt only the young; and, excepting some trivial distinction of surface-markings, I cannot find out on what Mr. Hodge relied to distinguish his supposed species.

HALACARUS CTENOPUS, Gosse, *loc. cit.* pl. 3. figs. 6-10.

Body smooth, granulated, divided below only; length  $\frac{1}{8\frac{1}{2}}$  of an inch; colour variable, dark red or yellowish brown, often with a white line down the centre; nearly oval, pointed in front, excavated at the insertions of the legs; transversely sulcate beneath, opposite the origin of the third pair of legs. The rostrum is more attenuated than in *H. rhodostigma*; but the palpi are stouter, the last joint being a short hook, and both it and the preceding joint bear a small spine upon the inner margin. The legs are of nearly equal length; thighs remote (laterally), those of the first two pairs and last two pairs of each side respectively originating close together; the joints diminish gradually in length and width to the last, which bears two falcate claws: each of these has an accessory piece near the extremity of the convex margin, and is strongly pectinated along the concave edge. Eyes two, large, situated near the base of the second pair of legs, and one much smaller near the base of the bulb of the rostrum.

The feet of the first pair are often armed on the middle of the inner edge of the third, fourth, and fifth joints (or one or more of them) with a single stout spine; but this is very variable, as also is the length and strength of the setiferous armature in general.

Mr. Gosse described this species from one specimen found in company with the foregoing. It seems, however, to be of common occurrence, and generally distributed round the British coast. I have taken it on weeds between tide-marks and a little below low-water mark at Cullercoats (Northumberland), Westport and Birterbuy Bays (Ireland), Little Cumbrae (Frith of Clyde), Isles of Aran (Galway Bay), and amongst the Scilly Islands; Mr. Robertson and myself have also dredged it in depths of 7-29 fathoms off Portincross (Ayrshire), in 20-35 fathoms off Red Cliff, Yorkshire, and in 10-12 fathoms off the Scilly Islands. Mr. Norman says it is

common among weeds in the littoral and laminarian zones in Shetland.

### EXPLANATION OF THE PLATES.

#### PLATE XLI.

- Fig. 1. *Cheyletus robertsoni*, seen from below.  
 2. Ditto, palp.  
 3. Ditto, extremity of first foot.  
 4. Ditto, extremity of third foot. } More highly magnified.  
 5. *Gamasus marinus*, seen from below.  
 6. Ditto, mouth-organs, more highly magnified: *a*, mandible; *b*, styliform appendage; *c*, palp.  
 7. Ditto, extremity of foot.

#### PLATE XLII.

- Fig. 1. *Pachygnathus sculptus*, seen from below.  
 2. Ditto, seen from side.  
 3. Ditto, body seen from above.  
 4. Ditto, mandibles.  
 5. Ditto, palp.  
 6. Ditto, extremity of foot. } More highly magnified.  
 7. *Raphignathus falcatus*, seen from above: *a*, palp; *c*, mandibular sheath.  
 8. Ditto: *a*, palp; *b*, protrusile mandible; *c*, mandibular sheath. } More highly magnified.  
 9. Ditto, protrusile mandible.  
 10. Extremity of foot.

### 5. Description of a new Species of *Chrysochloris* from South Africa. By Dr. ALBERT GÜNTHER, V.P.Z.S.

[Received April 3, 1875.]

(Plate XLIII.)

Mr. Herbert Trevelyan has presented to the Trustees of the British Museum the skin of a new species of *Chrysochloris*, which is distinguished by its gigantic size, being nearly double the size of any of the other species known. He obtained it from a Kaffir who accompanied a shooting-party in the Pirie Forest near King William's town (British Caffraria), and believes that it must be very scarce or local, as none of his companions had ever seen another specimen. Unfortunately the skull has not been preserved; otherwise the skin is in a most perfect condition. I name this species after its discoverer, and characterize it as follows:—

#### CHRYSOCHLORIS TREVELYANI.

Nine and a half inches long. The colour and quality of the fur reminds one of that of an Otter; it is moderately long, rather stiff, and of a deep chocolate-brown colour, with a dense whitish under-fur. Margin of the lips white. On the abdomen the fur is less dense and shorter; and patches of the whitish under-fur are visible in the posterior parts of the abdomen. Muffle flat, projecting as in the other species, but comparatively narrower. Claws whitish; the inner and

outer of the fore foot very conspicuous, the third twice as strong as the second. No trace of an opening for the eye or ears, or of the tail can be discovered.

Total length.....	millim.	243
Width of the muffle.....		9
Length of first front claw .....		4
"    second    "    .....		12
"    third    "    .....		20
"    fourth    "    .....		5
Length of fourth (and longest) hind claw .....		10

*Hab.* Pirie Forest, British Caffraria.

## 6. On the Specific Identity of the Weasel found in Malta.

By CHAS. A. WRIGHT, C.M.Z.S.

[Received April 5, 1875.]

The animal, of the order of Carnivora, a specimen of which I have the honour to exhibit to the Society this evening, inhabits the islands of Malta and Gozo in a wild state, and is by no means uncommon in the neighbourhood of farmyards, where it not unfrequently commits ravages on the poultry and other small inmates. It is also partial to eggs. It is well known to the country people under the name of *Ballottra*. It has been usual with writers on the natural history of Malta to refer to this animal as *Mustela vulgaris*, or the Common Weasel of Europe. That they are mistaken a glance at the specimen will show. It will be noticed that it is very much larger than the Weasel, even exceeding in size the Stoat (*Mustela erminea*), to which perhaps it bears most resemblance. Again, the tail is proportionally longer than in the Weasel; but instead of the end being black, as is the case with the Stoat or Ermine at all seasons, the termination is scarcely perceptibly darker. The colour of the Maltese species is generally chestnut, more or less dark in different individuals, and sometimes mixed with grey, especially in examples in winter. The underparts of the body, neck, and throat, as well as the toes and margin of the upper lip, are creamy white. The specimen I now exhibit does not show the natural colour, it being very much bleached by exposure to the rays of the sun penetrating through a glass case in which the specimen was kept. Its length from root of tail to tip of snout is about 13 inches, and the tail  $4\frac{1}{4}$  inches, making a total length of  $17\frac{1}{4}$  inches. I have frequently met with this species while out shooting, and on one occasion saw one making off across a field with what looked like a young one in its mouth. It takes refuge, and brings up its young, in the loose stone walls which everywhere traverse the country.

This animal appears to come very close to the *Boccamele*, which was first discovered by Cetti, in Sardinia, about a century ago, and



afterwards named *Mustela boccamela* by Bechstein. It is said to take the place of the Common Weasel (*Mustela vulgaris*) in that island\*.

In the 'Rendiconti dell' Accademia Scientifica di Napoli' for 1865, pp. 32-33, Professor Costa described a variety of the Common Weasel from Southern Italy, which he names var. *meridionalis*; it is said to be intermediate between *M. vulgaris* and *M. boccamela* as regards the length of the tail, which is two fifths of that of the body in the Sardinian Weasel, two ninths in the common species, and two sevenths in the variety mentioned†. Dr. Günther, however, thinks that Costa, in making this statement, has confounded *M. erminea* with *M. vulgaris*; and it is well known that not much dependence can be placed on the relative length of the tail as a distinctive feature, as it varies much in this group of animals.

Doderlein does not include *Mustela boccamela* in his observations on the Vertebrates of Sicily, but alludes to a white-footed variety of the Common Weasel (*Mustela vulgaris*), which approaches the *Boccamele* in character‡.

It has been said that *Mustela boccamela* is found in Southern Europe and Northern Egypt. On the other hand, Professor Cornalia, in his recently published Catalogue of the Mammalia of Italy, states that this species is only met with in the island of Sardinia. It is said to emit no bad smell (but, in my experience, this does not always hold good with the Maltese species), to be excessively fond of honey (as its name implies), to be lively, vivacious, and very easily domesticated§.

Cetti is of opinion that the *Mustela boccamela* is the *Ictis* of Aristotle, and gives very convincing reasons for thinking so||.

In Malta there is no tradition of its having been introduced, and it is never met with in a semi-domesticated state, as in the island of Sardinia.

Professor Cornalia, in the work above cited, gives the dimensions of the Common Weasel found in Italy (*Mustela vulgaris*) at 20 centimetres, and tail 5 centimetres; of *M. boccamela* 35 centimetres and tail 10.

Dr. Günther informs me that the British Museum does not contain a specimen of *Mustela boccamela*. The species which had been bought for it is nothing but an example of *Mustela erminea* from Algeria.

\* *Vide* Cetti, 'Hist. Sard. Quadrup.' i. p. 211, tab. 5; Bechstein, 'Naturg. Deutschl.' p. 819.

† *Vide* Zool. Rec. 1865, p. 37.

‡ *Vide* Alcuni Generalità intorno la Fauna Sicula dei Vertebrati, per Pietro Doderlein, Direttore del Museo di Zoologia ed Anatomia Comparata nella Regia Università di Palermo, 1872, p. 4.

§ *Vide* 'Fauna d' Italia,' parte prima, p. 33.

|| *Vide* Aristotle, Hist. Anim. lib. ix. cap. vi.

## 7. Descriptions of three new Species of Australian Birds.

By JOHN GOULD, F.R.S., V.P.Z.S., &amp;c.

[Received April 6, 1875.]

## Family PSITTACIDÆ.

## 1. APROSMICTUS INSIGNISSIMUS, Gould, P. Z. S. 1874, p. 499.

Head emerald-green, excepting the centre of the crown and a patch on the nape, these parts being scarlet, the green forming a narrow frontal line between the nostrils and the crown; round the hind neck a narrow collar of emerald-green; back, including the mantle and scapulars, deep grass-green, each feather obscurely edged with darker colour; lower back and rump shining blue; upper tail-coverts bright grass-green; all the tail-feathers above deep grass-green, with indistinct narrow bars of darker colour on every one of them; the underside of the tail uniform purplish black; wings green, with a broad longitudinal patch of yellow; many of these feathers edged with scarlet, this mark being very distinct and similar to that seen in the male of *Ptistes*; under wing-coverts greenish blue; inner lining of quills purplish black, like the lower surface of the tail; under surface of body scarlet, with dashes of bright green on the flanks; under tail-coverts green, fringed with scarlet, both mandibles of the bill bright red as in *Ptistes*, the tips lighter; legs blackish. Total length  $15\frac{1}{2}$  inches, wing 9, tail  $7\frac{3}{4}$ , tarsus  $\frac{7}{8}$ .

*Hab.* Queensland.

At the meeting of this Society held on the 3rd of November 1874, Dr. Sclater exhibited a painting of a new Parrot from Queensland on my behalf, as I was too unwell to attend the meeting: for this bird I proposed the name of *Aprosmictus insignissimus*. Since then, through the kindness of the authorities of the new Zoological Museum at Brisbane, I have received the actual specimen of this bird, and Dr. Sclater has again been kind enough to bring the bird before the notice of the meeting.

As before supposed, this bird is directly intermediate in form between *Aprosmictus* and *Ptistes*. In size it is still larger than the well-known King Parrakeet (*Aprosmictus scapularis*), while in coloration it is very different, as will be seen by the above description and measurements taken from the bird itself. That the specimen was killed before it had quite completed its plumage is pretty evident from the incomplete colouring of the crown of the head and nape: in the other parts no difference is likely to occur.

I take this opportunity of returning my hearty thanks to Mr. Waller, of Brisbane, and to Mr. Coxen, of the same town, for the interest they have shown in the matter of this newly discovered bird, and especially for the opportunity they have given me of introducing it to the notice of European ornithologists.

## 2. CYCLOPSITTA MACCOYI, n. sp.

*Male.* General colour green, the face having all the fantastic

colours of the Harlequin; on the forehead a band of bright scarlet, surrounded by cobalt, a shade of the same colour encircling the latter, narrow above, broader below; on the cheeks, from the base of the bill to the tips of the ear-coverts, a band of scarlet like that on the forehead; and below this is an obscure band of purplish blue, gradually fading off into the green of the neck; flank-feathers tipped with bright lemon-yellow; quills externally blue, the inner secondaries green, with the usual tiny patch of scarlet adjoining the back; tail green; under wing-coverts green, the outer ones washed with blue; quills blackish below, diagonally crossed near the base with a yellow band. Total length  $5\frac{1}{2}$  inches, wing  $3\frac{3}{8}$ , tail  $1\frac{3}{4}$ , tarsus  $\frac{3}{8}$ .

*Female.* Differs from the male in wanting the scarlet cheeks: in other respects similar.

*Hab.* Rockingham Bay, Queensland.

This pretty little species is quite different from all the *Cyclopsitta* known, and finds its allies in *C. coxeni* and *C. diophthalma*. It is one third less in size than *C. coxeni*, and about equal to *C. diophthalma* in dimensions; it is, however, even more beautiful than the latter in the colours of its face.

I gladly accede to the suggestion of Mr. Waller that this species should be named after Professor M'Coy, who has done so much for Australian science.

#### Family MELIPHAGIDÆ.

##### 3. PTILOTIS FLAVOSTRIATA, sp. n.

Head and hind neck dusky blackish, with a distinct shade of olivaceous on the crown, leaving a pure black patch on each side of the occiput; hind neck distinctly marked with triangular spots of dull white; mantle straw-yellow, the bases to the feathers dusky brown; scapulars brown, with large triangular whitish spots; lower back and rump brown, with dull olive margins to the feathers; upper tail-coverts and tail brown, paler at tip, the feathers narrowly margined with olive; wing-coverts brown, with large triangular whitish spots as on the scapulars, the greater series dark brown, tipped with whitish and margined with whity brown; quills dark brown, externally edged with olive and slightly tipped with whitish; region of the eye bare and yellow; the few feathers on the ear-coverts hoary; cheeks dull olivaceous buff, running into a distinct tuft of bright yellow; throat greyish white, washed with olive on the lower part; chest olivaceous, distinctly streaked with shaft-lines of bright yellow, the breast paler, the feathers being brown with broad triangular longitudinal spots of white; flanks and under tail-coverts light brown, washed with olive; under wing-coverts yellowish buff; the lower surface of the wings and tail ashy brown, with broad rufous buff margins to the inner webs. Total length  $7\frac{1}{2}$  inches, bill  $1\frac{1}{8}$ , wing  $3\frac{1}{2}$ , tail 3, tarsus  $1\frac{1}{16}$ .

*Hab.* Rockingham Bay.

April 20, 1875.

R. Hudson, Esq., F.R.S., V.P., in the Chair.

The Secretary read the following report on the additions to the Society's Menagerie during the month of March 1875.

The total number of registered additions to the Society's Menagerie during the month of March was 96, of which 58 were by presentation, 24 by purchase, 4 by exchange, 4 by birth, and 6 were received on deposit. The total number of departures during the same period, by death and removals, was 95.

The most noticeable additions during the month of March were as follows :—

1. An Indian Wild Dog (*Canis primævus*, Hodgson, sive *C. rutilans*, Temminck), from British Burmah, presented March 3rd, by Lord Northbrook, the Governor General of India. We have only twice before\* received living examples of this rare animal, which is said to be becoming very rare in all parts of India.

2. Three Black-crested Kites (*Baza lophotes*, Temm.) from India, purchased 5th March, being the first examples of this peculiar bird of prey ever received alive.

3. A Himalayan Magpie (*Pica bottanensis*, Delessert, Rev. Zool. 1840, p. 100) from Bootan, purchased 6th March. This representative of our well-known Magpie is likewise new to the Society's collection†.

4. A Hamadryad Snake (*Ophiophagus elaps*, Schlegel), purchased of Mr. W. Jamrach, 5th March. This specimen is about eight feet long, and is the first living example of this large and deadly Serpent received in Europe. Mr. Jamrach states that he obtained this specimen at Dhappa near Calcutta, along with some ordinary Cobras.

5. A Bearded Falcon (*Falco biarmicus*, Temminck), presented by Capt. Parry, of the barque 'Isabella Blyth,' March 15th. This Falcon was captured by Capt. Parry at sea about 100 miles west of the Cape of Good Hope. I am not aware that this southern form of our Peregrine has been previously alive in the Gardens.

6. Two Silky Hangnests (*Amblyramphus holosericus*, Scop.) from the Argentine Republic, received in exchange. This form is also a new addition to our aviaries.

7. A Blue-faced Amazon (*Chrysotis bouqueti*, Bechstein), deposited by Mr. Neville Holland, March 25th. We obtained by purchase an example of this rare Parrot some time since (see P. Z. S. 1874, p. 323, and 1875, p. 59, pl. xi.); but the present specimen is of special interest, as it was obtained by Mr. Holland in the island of St. Lucia, West Indies, and thus solves the question of the true *patria* of this scarce species.

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\* See Rev. Cat. Vert. (1872) p. 47.

† Mr. Dresser, in a recently issued part of the 'Birds of Europe,' proposes to unite this species to *Pica vulgaris*; but, as far as I can tell from an examination of the living bird, the Indian form is recognizable not only by its much larger size, but also by the different colour of the wings.

Mr. Edward R. Alston, F.Z.S., exhibited a rufous variety of the murine Dormouse, *Graphiurus murinus* (Desm.)\*, from West Africa, which had been sent to him for examination by Professor Young, of the University of Glasgow. He observed that this species varied much in the grey of the back, being more or less tinged with brown, and in the way in which the white of the lower parts sometimes passes into rufous. Hence it had been described under the various names *Myoxus coupei*, F. Cuvier†, *M. erythrobronchus*, A. Smith‡, and *M. cineraceus*, Rüppell§; but these species had all been reunited by Smuts|| and by Dr. Peters¶. None of the descriptions, however, agreed with the coloration of the present specimen, which was of a nearly uniform dull pale rufous, passing beneath into a dark yellowish grey. It agreed perfectly, however, in all other characters with normal individuals of *G. murinus*, and was doubtless merely an extreme example of the rufous variation.

Mr. Alston also remarked that the type of *G. elegans*, Ogilby\*\*, now in the British Museum, seemed to be only a young specimen of *G. capensis*, F. Cuvier, and that consequently only two species of this genus appear to be well established.

A communication was read from Lieut. R. J. Wardlaw-Ramsay, F.Z.S., dated "Tonghoo, British Burmah, Nov. 22nd, 1874," containing the following remarks on his *Gecinus erythropygus*†† (P. Z. S. 1874, p. 212, pl. xxxv.):—"I have just obtained a pair of specimens of *Gecinus erythropygus*, in which the yellowish facial streak is entirely wanting. My original description was taken from a pair (♂ and ♀) in which the streak was strongly marked in the former and absent in the latter—on which ground I considered it to be a sexual distinction. Mr. Hume, in his description of this bird as *G. nigri-genis* ('Stray Feathers,' 1874, p. 446), tells us that among his specimens there is one only, and that a ♀, which has the streak; from which it would appear that both sexes are sometimes found with it, but that it is not constant in either."

Mr. W. B. Tegetmeier, F.Z.S., exhibited two specimens of wild-bred hybrid Pheasant between *Phasianus colchicus* and *Euplocamus nycthemerus*, lately shot in Surrey, and made the following remarks:—

"The two hybrid Pheasants exhibited resulted from the escape of a Silver Pheasant hen from confinement, and her association with the common Pheasant in a preserve.

\* Mammalogie, Suppl. p. 542 (1820).

† Hist. Nat. des Mamm. iii. p. 251 (1822).

‡ Zool. Journal, iv. p. 438 (1829).

§ Mus. Senckenbergianum, iii. p. 136 (1845).

|| Enum. Mamm. Capensium, p. 34 (1832).

¶ Reise nach Mossambique, p. 136 (1852).

\*\* P. Z. S. 1838, p. 5.

†† It appears that this species had been previously described and figured by Mr. Elliot, in Nouv. Archiv. du Muséum (Bulletin), 1865, p. 76, pl. iii., as *Gecinus erythropygus* (cf. Walden, 'Ibis,' 1875, p. 148).

"They were apparently male and female; but their sex was not determined by the preserver.

"The cock is distinctly spurred, the general colour of the plumage being green and brown with bright metallic reflections. He has no sign of crest nor any trace of the pencillings of the Silver Pheasant.

"The hen is spurless, her general colour light mottled brown; the tail long and pointed and meshed, with transverse bars closely resembling those of the Scemmerring's Pheasant; a small pendent crest proceeds from the occiput."

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The following papers were read :—

1. On the Occurrence of *Helix coactiliata* in Trinidad; with Remarks on the Distribution of the Land and Freshwater Mollusca of that Island. By R. J. LECHMERE GUPPY, F.L.S., F.G.S., &c.

[Received March 30, 1875.]

*Helix coactiliata* was described by Férussac in the 'Histoire des Mollusques,' vol. i. p. 18, and figured on the 72nd plate of that work (figs. 1-5). Férussac remarks of it "Petite espèce discoïde, dont le port se rapproche un peu de celui de quelques espèces d'Europe." Reeve also figures the shell in his Monograph of *Helix*, No. 595, and gives *H. nystiana* as a synonym. Mr. Ralph Tate, F.G.S., collected land-shells in Venezuelan Guiana in 1869; and amongst them was a *Helix* which, on comparison with specimens in the British Museum, I found to be *Helix coactiliata*. Comparing them with Férussac's and Reeve's figures I do not observe any essential difference, though our specimens may be a little larger than those figured. I am told, however, that the Venezuelan shell has been determined as *H. parkeri* of Tryon; but I prefer for the present to adhere to Férussac's name. According to Férussac *H. coactiliata* has been found in Nicaragua and in Peru; and its range is now extended to Venezuela and Trinidad, it having been found by Mr. Tate in the former country and by myself in the latter island\*. The species, as noticed by Férussac, resembles certain European shells, and particularly, I think, *Helix ericetorum*. It is interesting to notice that in the same part of Venezuela where *H. coactiliata* occurs is found also the *H. labyrinthica*, a species which has been found in the Eocene of Europe, but was until lately supposed to be confined in the living state to certain parts of North America. I need hardly remind zoologists of the very great differences, or rather, I should say, the entire distinctness of the Molluscan faunas of North and South America. It is true that the fauna of the latter division of the continent, taken in a broad sense, runs as far north as Mexico

\* I am informed by Mr. T. Bland that *H. coactiliata* has also been found in Guatemala, and that Messrs. Crosse and Fischer regard *H. cordovana* and *H. suturalis*, Pfeiff., as synonyms.

and includes Central America. Amongst other Mollusca the *Helicinae* and *Bulimi* of the latter region are of South-American types, the truly North-American fauna being characterized by the absence or comparative rarity of those genera and the development of peculiar forms of depressed and toothed *Helices*. These considerations invest with some interest the occurrence in South America of *Helix labyrinthica* and of a form so near to *H. ericetorum* as *H. coactiliata*. It is, however, well known that there are other South-American Mollusca which have affinities somewhat similar\*. I shall proceed to remark upon a few of these alliances. The South-American *Bulinus bilabiatus* finds a relation in the *B. auris-vulpina* of St. Helena. Still more curious is the distribution of so well-marked a genus as *Streptaxis*. It is found in South America, Bourbon, Rodriguez, Ceylon, India, and China. *Bulinus constrictus* of Venezuela, and a shell found by me in Trinidad and described as *B. pilosus*, have some remarkable points of resemblance to two St.-Helena shells called *B. digitalis* and *B. helena*. We may remember also that the genera *Anostoma* and *Megaspira*, found fossil in the Eocene of Europe, are living in South America†. This combination of facts is difficult of explanation when we consider that one portion of the affinities is with the early Tertiaries of Europe, and another with the existing fauna of the Indian and Chinese regions. The Miocene fauna of the West Indies exhibits similar relations. An explanation will doubtless be found; and it will probably include the hypothesis which assumes a land connexion between the opposite sides of the Atlantic in Tertiary or Cretaceous times. I have not alluded to the occurrence of two East-Indian Mollusca in the West Indies—namely *Pupa (Ennea) bicolor* in St. Thomas, Grenada, and Trinidad, and *Diplommatina huttoni* in the latter island; for one of these species may have been introduced, though there is more doubt as to that being the case with the other‡. But from the botanical, no less than the zoological, evidence I am inclined to believe that the connexion between the eastern and western continents existed in Mesozoic times, and that it was the disruption of this connexion that determined the Cretaceous period, and caused the wide biological gap between that period and the Eocene. Some arguments on this head based on palæontological evidence will be found in papers written by me in 1866§. But I now state the conclusion to which I have been drawn in broader terms; and I would further insist upon the proposition that the land connexion (which need not at any time have been continuous) extended from the now-sunken Caribbean continent to northern Africa. For facility of explanation

\* See Forbes, cited by Woodward, Man. Moll. second edition, p. 96.

† The *Pedipes glaber* of the English Eocene is a South-American form. It belongs to that section of *Cionella* called *Leptinaria*. The *Achatina costellata* of Sowerby is a species of *Glandina*—a genus belonging to the West Indies and Central America.

‡ See Ann. & Mag. Nat. Hist. 3rd ser. vol. xx. p. 95, and 4th ser. vol. i. p. 110; also Amer. Journ. Conch. 1870, p. 308.

§ Quart. Journ. Geol. Soc. vol. xxii. p. 584, and Geol. Mag. vol. iv. (1867) p. 496.

I would refer to Professor Marcou's map showing the extent of the land which probably existed in the Jurassic period \*. If the boundary of the Atlantic land there represented be extended a little southward, so as to take in the island of St. Helena, we can form an idea of the total extent of the land which may have existed during the later Secondary and earlier Tertiary periods †. Nevertheless I cannot overlook the grave difficulties of the problem, in face more particularly of the peculiarities of the African fauna. The observations herein contained may therefore be regarded as suggestions which will be of use when the additional knowledge is forthcoming to enable us to decide on the true relations of the facts.

The species of land and freshwater mollusca known to be common to Trinidad, the West-Indian Islands, and the American continent are the following :—

<i>Stenogyra octona</i> , Chemn.	<i>Pupa (Vertigo) eyriesi</i> , Drouët.
— <i>caracasensis</i> , Reeve.	<i>Streptaxis deformis</i> , Fér.
— <i>plicatella</i> , Guppy.	<i>Succinea approximans</i> , Shuttl.
<i>Cionella lamellata</i> , Pot. & Mich.	<i>Veronicella lævis</i> , Fér.
<i>Helix ierensis</i> , Guppy.	<i>Physa rivalis</i> , Mat. & Rack.
<i>Bulimus oblongus</i> , Müll.	<i>Marisa cornu-arietis</i> , Linn.
<i>Orthalicus undatus</i> , Brug.	<i>Ampullaria urceus</i> , Müll.
<i>Bulimulus tenuissimus</i> , Fér.	— <i>effusa</i> , Müll.

The following five species have been found in Trinidad and in the Antilles, but are not known to occur on the continent :—

<i>Bulimus auris-sciuri</i> , Guppy.	Tobago.
<i>Pupa bicolor</i> , Hutton ( <i>Ennea</i> ).	Grenada, St. Thomas.
<i>Cyclotus grenadensis</i> , Shuttl.	Grenada.
<i>Cyclas incurva</i> , Guppy.	Guadeloupe.
<i>Planorbis terverianus</i> , Orb.	Cuba, &c.

*Bulimus auris-sciuri* is a race or local form of *B. glaber*, a species extensively distributed on the continent. *Pupa bicolor* is supposed with some probability to have been introduced from India. *Cyclotus grenadensis* is intermediate between the characteristic Jamaican forms and *C. stramineus* of Venezuela. The two freshwater shells are of South-American type, though the species are known from the Antilles and Trinidad only and not yet recorded from the continent.

The species found in Trinidad and on the continent, and not known to occur in the Antilles, are the following nine :—

<i>Zonites guildingi</i> , Bland.	Porto Cabello.
<i>Guppya vacans</i> , Guppy.	Venezuelan Guiana.
<i>Helix coactiliata</i> , Fér.	Venezuelan Guiana.
— <i>bactricola</i> , Guppy.	Venezuelan Guiana.
<i>Bulimulus vincentinus</i> , Pfeiff.	Carupano (Venezuela).
<i>Cylindrella trinitaria</i> , Pfeiff.	Carupano (Venezuela).

\* Marcou, Lettres sur les Roches du Jura : Paris, 1860.

† Respecting the distribution of land in the Tertiary period, see a paper by Bourguignat, in Ann. Sci. Nat. Zool. 5<sup>e</sup> ser. vol. v. (1866) p. 313 and plate 11.



*Cyclotus translucidus*, Sow. Venezuela.

*Helicina barbata*, Guppy. Carupano (Venezuela).

— *lamellosa*, Guppy. Venezuelan Guiana.

When these nine species are added to those contained in the first list, we have twenty-five as the number of species ascertained to be common to Trinidad and the adjoining continent.

The list of species remaining as peculiar to Trinidad, so far as is yet known, includes the following:—

*Glandina minutissima*.

*Spiraxis simplex*.

*Zonites implicans*.

— *umbratilis*.

*Hyalina alicea*.

*Helix caeca*.

*Bulimus pilosus*.

*Bulimulus aureolus*.

*Pupa uvulifera*.

*Simpulopsis corrugatus*.

*Amphibulima felina*.

*Ancylus textilis*.

*Gundlachia crepidulina*.

*Planorbis meniscus*.

*Amnicola spiralis*.

*Diplommata huttoni*.

*Blandiella reclusa*.

*Cistula aripensis*.

*Helicina nemoralis*.

— *ignicoma*.

*Cyclas punctifera*.

*Anodon leotaudi*.

This list contains the names of twenty-two species. To it might be added *Stenogyra coronata* and *Pupa auriformis*; but as hitherto only a single specimen of each has been found, they may be regarded as doubtful; and the same reason may be given for leaving out *Autonoe riparia*.

On examination of this list the number of really peculiar forms seems to be very few. Many of the shells whose names are here included are minute, and most occur only in very restricted localities; so that even if existing in the Antilles or on the continent they might easily have escaped notice. *Glandina minutissima* is perhaps the smallest of all known land-shells, unless *Achatina iota* of Adams (to which our species seems to be allied) should prove to be less in size. *Spiraxis simplex* is akin to some of the plainer forms of *Spiraxis* found in the West Indies. The two *Zonitæ* are minute. *Hyalina alicea* may prove to be a *Macrocyclus*, as has happened in the case of *H. concolor* (*baudoni*). *Bulimus pilosus* is allied to *B. constrictus*, a Venezuelan shell, of which a variety is described in a note communicated by me to the Society. *Pupa uvulifera* is a small species belonging to a type of world-wide distribution. *Simpulopsis* is a South-American genus, having one or two species in the Antilles. It is probable that *S. corrugatus* will be found in Venezuela, if indeed it is not identical with one of the species already described from South America. *Amphibulima* (*Omalonyx*) *felina* is very close to, if not identical with, *O. unguis* of Guadeloupe. There is some doubt about the identity of the latter with the South-American *O. unguis*. Of *Ancylus textilis*, *Gundlachia crepidulina*, and *Planorbis meniscus* it may be said that they will probably be found in South America on search; and *Amnicola spiralis* may be placed in the same category. Furthermore the latter is not easy to distin-

guish from *A. candeana*, Orb., found in Cuba and Jamaica, in the latter island receiving the name of *Melunia spinifera* Ad. *Diplommantina huttoni* is presumed to be identical with an Indian species, as already noticed. *Blandiella reclusa* (as well as *Hyalina alicia*) has hitherto only been found in one of the wildest and least-explored parts of Trinidad, but may very likely occur in the mountains of Venezuela. The genus *Blandiella* is intermediate between *Truncatella* and *Geomelania*, and is said to be synonymous with *Taheitia*. *Cistula aripensis*, though quite distinguishable from, is very nearly related to *Chondropoma tamsianum*, which occurs in the hills of Venezuela opposite to Trinidad along with *Cylindrella trinitaria* and *Helicina barbata*. It may be doubted whether the distinction between *Cistula* and *Chondropoma* is a real difference. *Helicina nemoralis* is allied to *H. columbiana* of Venezuela; and *H. ignicoma* is very near to *H. plicatula*, found in Cuba, Guadeloupe, &c. The two remaining freshwater bivalves of the list, though not hitherto found elsewhere, scarcely call for remark, especially when we take into consideration that, as a rule, the freshwater shells of the West Indies are of South-American types.

Thus we have seen that, with the exception of the *Diplommantina* and of *Pupa bicolor*, the molluscan fauna of Trinidad is almost entirely South American, and that very few of the species are of Antillean origin.

From the present list I have excluded *Bulimulus fraterculus* and *B. multifasciatus*—the shell considered to be the former being *B. tenuissimus*, and the *B. multifasciatus* of Trinidad being only a form of *B. vincentinus*, and not the true *B. multifasciatus* of Lamarck.

The distribution of the amphibious Pulmonata and Truncatellidæ is similar to that of the marine mollusca, and has therefore been left out of account in the foregoing paper. The following only have been found in Trinidad:—

*Melampus coffea*, Linn.

*Siphonaria lineata*, Orb.

— *pusillus*, Gmel.

*Truncatella pulchella*, Pfeiff.

*Pedipes mirabilis*, Megerle.

In conclusion I should acknowledge my obligations to Mr. Ralph Tate, F.G.S., for information as to the occurrence in South America of several species previously only known from Trinidad.

2. Note on a Variety of *Bulimus constrictus* found in Venezuelan Guiana. By R. J. LECHMERE GUPPY, F.L.S., F.G.S., &c.

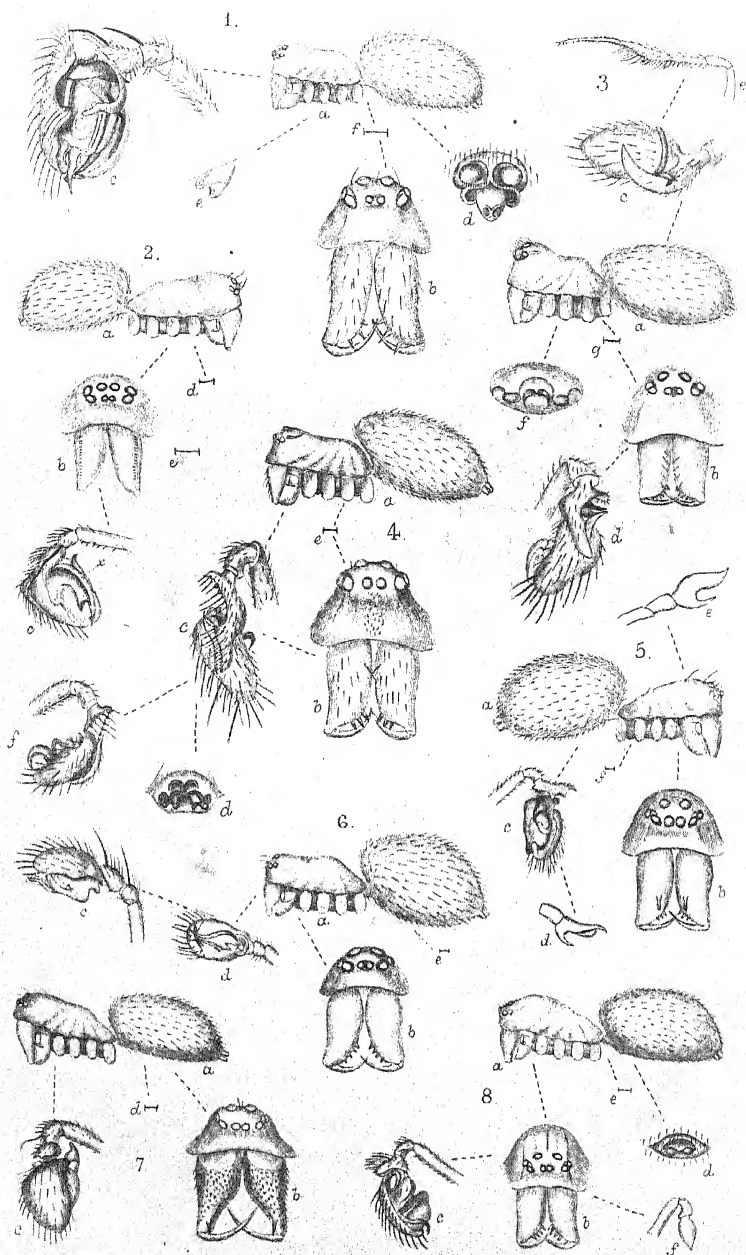
[Received March 30, 1875.]

This variety may be described as follows:—

**BULIMUS CONSTRICTUS, var. TATEANUS.**

Shell oblong-conic, rather thin, minutely cancellate, white under





O.P. Cambridge delt  
A.T. Hollick lith.

NEW SPECIES OF ERIGONE.

W. West & C<sup>y</sup> imp.

a reddish brown, densely pubescent epidermis disposed in numerous fine spiral lines crossed by striæ of growth. Whorls 6, convex, gradually increasing, the last forming more than one half, the first two usually bare of epidermis and ornamented with a rugosely costellate sculpture. Suture rather deep. Aperture oval. Outer lip white, a little thickened and everted. Columella thickened and broadly reflected over the very deep umbilical perforation. Length 17, breadth 8, height of aperture 6 millimetres.

Venezuelan Guiana (*B. Tate*).

This variety is rather smaller than the type, and is apparently more densely pubescent; but the latter character may be partly due to the state of preservation of the shells. It would appear also that the cancellation and more particularly the sculpture of the apex are more strongly marked than in the type.

The nearest known relative of *B. constrictus* is, I believe, a shell described by me as *Bulimulus pilosus* (Amer. Journ. Conch. 1870, p. 310). That shell is of a lighter colour, is rather smaller, and has a less-dense pubescence. When æstivating, *B. constrictus* forms a white calcareous epiphragm, which does not happen with *B. pilosus*. The shape of both species is almost exactly that of *B. oblongus* in miniature. They seem to find their nearest allies in St. Helena, having points of resemblance to *B. digitalis* and *B. helena* of that island. The character of the apex is very peculiar; and I am informed by Mr. T. Bland that he has detected a somewhat similar feature in other *Bulimi* from the central portions of the American continent. The apex of *B. pilosus* is costellate; in *B. constrictus* it is often, though not always, somewhat rugose: these differences seem to be principally due to the more or less eroded state of that part. It was on account of the very considerable differences between these shells and those ranked as *Bulimulus* that I formerly referred them to *Buliminus*; but it is possible that they belong to neither of those genera, but form a separate group under the genus *Bulimus* (as restricted in Albers, 'Die Heliceen,' 2nd ed.). That group may retain the name of *Rhinus* (Albers, p. 223), but should perhaps be removed from *Bulimulus*, and placed, along with *Pachnodus* (*op. cit.* p. 230), or at least a part of that section, under *Bulimus*, adding to the definition of *Rhinus*, after "*anfr.* 6-7," the words "*apice costellata vel rugoso-costellata.*"

### 3. On some new Species of *Erigone*.

By the REV. O. P. CAMBRIDGE.—Part II.

[Received March 31, 1875.]

(Plate XLIV.)

The following pages comprise descriptions of nine species of *Erigone* additional to those described in a former paper (p. 190, *supra*), and all received from various localities in France. While, however, those described in the former paper were, with two exceptions, of

the genus *Walckenaëra*, Blackwall, those now described are of the genus *Neriere* of that author.

Excepting one species, all, both in the present and former papers, were sent to me by M. Eugène Simon, and were accompanied by examples of numerous other known species. A list of these latter (45 in number) with the localities in which they were found is added at the end of this paper. The whole number of species of this interesting group thus received from M. Simon amounts to seventy-nine, the greater part of them having been found in France.

*ERIGONE PABULATRIX*, sp. n. (Plate XLIV. fig. 1.)

Adult male, length nearly 2 lines.

The whole of the fore part of this Spider (except the labium and sternum, which are suffused with brown) is of a clear yellow slightly tinged with orange; the cephalothorax is of ordinary form; the caput is not raised above the thoracic level, the whole profile forming a nearly uniform gentle curve; the normal grooves and indentations are slightly marked; the clypeus is very nearly vertical, and its height exceeds (but not greatly) half that of the facial space.

The *eyes* are in the usual position; those of the hinder row are equidistant, or very nearly so, from each other; those of the fore central pair are very minute, placed on a blackish spot, and not contiguous to each other, being divided by nearly a diameter's distance, and each of them is separated from the fore lateral eye on its side by an interval equal to a diameter of the latter, and from the hind central nearest to it by a smaller interval, more nearly equal to that which separates those of the hinder row; those of each lateral pair are seated obliquely on a strong tubercle and are contiguous to each other. In one example of the male there was no tubercle on the right side, and the eyes of the lateral pair there were very minute, evidently in a semiaborted state; looked at from the front, the convexity of both rows is directed backwards, that of the hinder row the most strongly.

The *legs* are not very long, but tolerably strong, and tapering in form, their relative length being 4, 1, 2, 3. They are furnished with hairs, a very few slender spines, and some short, erect, fine bristles.

The *palpi* are short and slender (except the digital joint): the cubital and radial joints are very short; the latter is the strongest and has its fore extremity slightly produced into an obtuse point; a straight, strong, prominent, tapering, spine-like bristle, rather exceeding in length the joint itself, issues from the fore extremity of the upper-side of the cubital joint, and another longer, but less strong, and curved, springs from near the fore extremity of the radial joint, which has also a series of finer bristles round the inner margin; the digital joint is large and of an irregular oval form, the outer margin having a strong, nearly circular, prominent lobe near the middle, and its hinder extremity being prominent in a blunt angular form: the palpal organs are directed outwards, very prominent and complex, with various corneous spines and processes; among these is a large, strongly curved,

and somewhat crescent-shaped one at their base on the outer side, the upper limb of the crescent having a series of short bristly hairs on its margin, and from their extremity projects a reddish brown spiny process whose point is somewhat bifid, and near its base there is a small, curved, pointed spine; the general colouring of the palpal organs is yellowish red-brown, of different tinges, mixed with a little black on the edges of some of the processes.

The *falces* are long, strong, vertical, and rather divergent; towards the extremity of each falx, on the inner side, are three teeth rather widely separated from each other, the upper one being much the smallest.

The *maxillæ* are of moderate length, of a broad oblong form, with the outer corners of their fore extremities rounded off and a little inclined towards the labium; this latter is very short, of a somewhat semicircular form, and of a yellow-brown colour, similar to that of the sternum.

The *abdomen* is of oval form, moderately convex above, and projects a very little over the base of the cephalothorax; it is of a dull pale yellowish brown colour, and clothed (but not thickly) with hairs.

The female is larger than the male, the abdomen being much more convex above, and projecting considerably over the base of the cephalothorax; the form of the genital aperture is peculiar, and from within it there projects backwards a not very long, but strong epigyne.

Adults of both sexes of this species were received from M. Simon, by whom they were found at La Grande Chartreuse, France.

This Spider belongs to Menge's genus *Bathypantes*, which, though difficult to characterize distinctively from either *Linyphia* or *Erigone*, will probably eventually be held to be a good genus. It certainly appears to have as much affinity with the former as with the latter; and its ultimate place will probably be that of a transitional group distinct from either.

#### ERIGONE SERRATA, sp. n. (Plate XLIV. fig. 2.)

Adult male, length not quite 1 line.

This Spider is very closely allied to *E. sylvatica*, Bl., but may be distinguished at once by being much smaller, by the caput being less elevated, its highest point being no higher than the thoracic junction, and also by the closer grouping of the eyes, those of the hinder row being as nearly as possible equidistant from each other, while in *E. sylvatica* the interval between those of the hind central pair is distinctly less than that between each of them and the hind lateral on its side. Owing to the less-elevated caput, the height of the facial space and clypeus is also distinctly less than in *E. sylvatica*.

In several important particulars there is a very marked similarity between the two species. Thus the present one has the peculiar, and very characteristic, longitudinal row of minute denticulations on the front of each of the falces; the palpi and palpal organs also are remarkably similar, the latter having on their outer side an almost identically shaped corneous process, whose upper edge is distinctly serrated; the cubital joint also has a similar strong, tapering, nearly

straight, spine-like bristle projecting forwards near the outer side of its fore extremity; and the digital joint is enlarged in a similar sub-angular form near its base on the inner side.

In the examples examined the colours cannot be depended upon: they had evidently not long since effected the final moult, and thus the uniform colouring was of a pale whitish straw tinge, which would, no doubt, have shortly deepened into the permanent colours of the adult spider; from such indications, however, as there were, it seemed probable that the final colours would be very like those of *E. sylvatica*.

The difference in size between these two species is very marked, the length of *E. sylvatica* (taken from several adult examples) being  $1\frac{3}{4}$  line, while that of the present Spider is nearly a line less.

While, therefore, I do not hesitate to characterize the present Spider as a distinct species, it is yet almost the only one known to me in which so great a similarity in the palpi and palpal organs is joined to so tangible a difference in the form of the caput and position of the eyes. Numerous species are known whose caput and eyes present no tangible difference, while the palpi and palpal organs are very distinct; but the converse is exceedingly rare.

Two adult males were received from M. Simon, by whom they were found at Troyes, in France, in 1871.

*ERIGONE NEMORIVAGA*, sp. n. (Plate XLIV. fig. 3.)

Adult male, length  $1\frac{1}{2}$  line.

The *cephalothorax* (as well as the falces and sternum) of this Spider are of a dull orange-yellow colour and glossy; the caput is distinctly, generally, and convexly, but not very greatly, elevated above the level of the thorax; running backwards longitudinally from behind each lateral pair of eyes is a small elongate indentation; the clypeus, whose height equals, if it does not exceed, two thirds of that of the facial space, is impressed below the eyes, but projects at its lower margin; and the ocular area is furnished with a few slender bristly hairs.

The *eyes* do not differ greatly in their relative size; they are in the ordinary position on the front slope of the upper part of the caput, and are all rather prominent, being seated on black tubercles; those of the hind central pair are rather nearer to each other than each is to the hind lateral on its side, being separated by a little more than a diameter's distance; those of the fore central pair are smallest of the eight, and are near together, though distinctly separated from each other; the interval between each of them and the hind central eye nearest to it is as nearly as possible equal to that between each hind central and the hind lateral on its side; those of each lateral pair are contiguous to each other and obliquely placed; and each fore lateral forms, with the fore and hind central eyes on its side, as nearly as possible an equilateral triangle.

The *legs* are rather long and tolerably strong, their relative length being 1, 4, 2, 3; they are furnished with hairs and a few short, slender, inconspicuous, erect bristles on their uppersides;



the tibiæ of the first pair are rather incrassated on the underside not far from the fore extremity, and at this part the hairs are longer, stronger, and more numerous than elsewhere; the undersides of the femora of the first pair of legs are also furnished with short, very slightly curved semispinous bristles; these characteristics of the first pair are repeated, though in a much less marked degree, in the legs of the second pair. The colour of the legs is a clear yellow.

The *palpi* are similar to the legs in colour; they are short, but rather strong, and the cubital joint is curved: the radial is very short, but has its fore extremity on the inner side produced into a long, strong, slightly curved apophysis, whose extremity points outwards; from beneath the outer side of this apophysis spring two prominent corneous projections whose independent sharp points meet in a somewhat scissor-like form: the outer side of the radial joint is also produced into a short, prominent, obtusely pointed apophysis, whose extremity is furnished with a few very short divergent bristles; and below this near the underside of the radial joint is another slightly curved corneous projection, apparently connected with the two others, whose points meet as above mentioned. The structure of this joint is very peculiar, and by no means easy to observe or describe correctly; but the particulars given, together with the figures, will, it is believed, serve to distinguish it readily from any other yet described. The digital joint is of good size, obtuse at its fore extremity, and furnished with coarse hairs. The palpal organs are prominent and rather complex, with a strong, curved, pointed corneous process towards their fore extremity.

The *falces* are moderately long and tolerably strong, being rather prominent near the middle in front, when looked at in profile; they are each furnished with two or three teeth close together near their extremity on the inner side, there being also another a little above them and rather more in front.

The *maxillæ* and *labium* are similar in colour to the legs, and present no unusual feature.

The *abdomen* is oval, tolerably convex above, glossy, but of a dull leaden black colour, sparingly clothed with hairs, and does not project very much over the base of the cephalothorax.

The *female* differs from the male in the relative length of the legs, which are 4, 1, 2, 3, instead of 1, 4, 2, 3, those of the first pair entirely wanting the distinctive characters of those of the male, while a few very slender erect spines are observable on their upper-sides; the abdomen is of a yellowish brown hue slightly suffused with blackish behind and towards the underside; it is also more densely clothed with hairs than that of the male, and (in spirit of wine) there are several pale transverse curved lines in a longitudinal series visible on the hinder part above the spinners; the form of the genital aperture is characteristic. It is possible that this may not be the female of the male above described, though it agrees sufficiently well with it in general characters.

An adult example of each sex was sent to me by M. Eugène Simon, by whom they were found at Troyes, France, in 1871.

*ERIGONE CORALLIPES*, sp. n. (Plate XLIV. fig. 4.)

Adult male, length rather more than 1 line.

The *cephalothorax* is of ordinary form; its colour is a deep rich yellow-brown, slightly tinged with reddish; the caput is not elevated, being of the same general convexity as the rest of the cephalothorax; looked at in profile there is a slight hollow between the occiput and the thoracic junction: the height of the clypeus is two thirds that of the facial space; it is impressed transversely just below the eyes, and is a little prominent at its lower margin, and there is a narrow longitudinal indentation running backwards from behind each lateral pair of eyes.

The *eyes* are in the usual position, of moderate size, and do not differ greatly in their relative proportion; the hinder row is the longest and most curved, and the eyes composing it are equidistant from each other; those of the fore central pair are very near together, but not contiguous to each other, each of them is separated from the hind central eye nearest to it by an interval rather greater than that which divides the hind centrals, but equal to that which separates it from the fore lateral on its side; those of each lateral pair are seated obliquely on a strongish tubercle.

The *legs* are of a bright reddish orange-yellow colour, furnished pretty conspicuously with hairs, and a few very slender tapering erect inconspicuous bristles; they are long and tolerably strong, their relative length being 4, 1, 2, 3, those of the fourth pair being distinctly the longest; the undersides of the fore part of the tibiae of those of the first pair are a little incrassated and furnished more thickly with hairs than other parts.

The *palpi* are not very long, but of moderate strength, and similar in colour to the legs; the cubital joint is short, and rather abruptly bent downwards; the radial joint is of very remarkable form; the margins both before and behind on the outer side, which is a little prominent, have a series of about five small tooth-like tubercles, each of which is furnished with a single bristly hair; the inner side is produced into a very long, strong, irregularly formed apophysis, the extremity of which is a little curved and not very sharply pointed; the outer margin of the extreme half is of a corneous nature, and its hinder extremity is pointed and prominent; when looked at from the front, the radial joint and its apophysis look very much like an elongated digital joint with a large and somewhat circular piece taken out of its outer side near the base; within the hollow formed by this emargination is a short, strong, curved black spiny process; the digital joint is of tolerable size, appended to the radial at some little distance from its hinder extremity; the palpal organs are complex, and (among others) have a strongly curved sharp-pointed corneous process near their extremity; the radial and digital joints are slightly tinged with brown.

The *falces* are strong and of tolerable length; they are similar to the legs in colour, and armed on the inner margin towards their fore extremities with three sharp teeth close together; the fangs are rather weak.

The *maxillæ* are of a somewhat oblong oval form, inclined (but not curved) towards the labium; they are similar in colour to the *falces*, the extremities, however, being of a whitish hue.

The *labium* is very short and of the ordinary somewhat semi-circular form, its colour being darker than that of the *maxillæ*.

The *sternum* is similar in colour to the cephalothorax, and clothed thinly with longish bristly hairs.

The *abdomen* is large, tolerably convex above, and projects well over the base of the cephalothorax; it is of a dark yellow-brown colour, and thinly clothed with fine hairs; when seen in spirit of wine it is finely mottled and marked with yellowish lines.

This Spider is nearly allied to *E. nemorivaga*, p. 326, but may be easily distinguished on comparison with the figures and description of that species.

The adult female resembles the male in colours and general characters; the clypeus, however, is lower, and the *falces* have four teeth instead of three; the form of the genital aperture is rather complex and defies description, but some idea of it may be obtained from the figure given.

I had some doubt at first whether this Spider were not identical with *Erigone paradoxa*, L. Koch, the radial joint of the male palpus being of a very similar form; but I am inclined to believe it to be quite distinct.

Both sexes were received, in January 1874, from M. Simon, by whom they have been found in several parts of France.

#### ERIGONE FLUCTUANS, sp. n.

Adult male, length 1 line.

This Spider is very nearly allied to *Erigone subtilis*, Cambr.; it may however, be distinguished by several particulars, noticed here.

The *cephalothorax* is of a yellow-brown colour, rather flat, with a very slight impression in the profile line, behind the occiput, and the hinder slope is short and very gradual; the height of the clypeus, which is vertical and has no transverse impression, is less than half that of the facial space.

The *eyes* are smaller than those of *E. subtilis*; those of the hinder row are equidistant from each other; if any thing the hind centrals may be rather nearer together than each is to the lateral of the same row on its side.

The *legs* are of a brownish yellow colour, tolerably long, slender, and furnished with hairs and a very few short strong bristles or very slender spines.

The *palpi* are short; the radial joint is stronger than the cubital, and has a small, somewhat tooth-like apophysis at its outer extremity, when looked at from the front and rather on the inner side; the digital joint is of moderate size, and has a conical prominence at its base, with its extremity directed inwards; the palpal organs are complex, but do not present any very large or remarkable processes.

The *falces* are strong and produced at the extremities, which are strongly divergent, the divergent portions excavated on the inner

sides and furnished (at the parts furthest from the fangs) with two or three minute teeth.

The *abdomen* is of a blackish yellow-brown colour.

A single example of the adult male was received, in April 1873, from M. Eugène Simon, by whom it was found near Paris.

*ERIGONE VIVA*, sp. n. (Plate XLIV. fig. 5.)

Adult male, length  $\frac{2}{3}$  of a line =  $1\frac{1}{2}$  millim.

The *cephalothorax* of this Spider is of a brownish yellow colour, and presents nothing remarkable in its form; the profile line is slightly but pretty uniformly curved, its highest point being at the occiput; the ocular region, as well as the median line from it backwards, is furnished with a very few prominent hairs. The height of the clypeus equals half that of the facial space, and projects a very little forwards at its lower margin.

The *eyes* are rather large, nearly equal in size, and seated on black spots, and, except those of the fore central pair, which are dark-coloured, of a bright pearly white lustre; the front row is (as is usually the case) the shortest, and (looked at from above and behind) the two rows appear equally curved from each other, forming a regular transverse oval figure; those of the hinder row are equidistant from each other, being separated by as nearly as possible an eye's diameter, those of the fore central pair (which are larger than usual, being but little smaller than the rest) are contiguous to each other, and each is separated by only a very slight interval from the fore lateral eye nearest to it; those of each lateral pair are seated obliquely on a tubercle and are contiguous to each other; thus the eyes of the lateral and fore central pairs form an almost continuous, semicircularly curved line. Each hind central eye is separated from the fore central nearest to it by an interval equal to that which divides those of the hinder row.

The *legs* are moderate in length and strength, their relative length being distinctly 1, 4, 2, 3; they are of rather a paler colour than the cephalothorax, and are furnished with hairs and slender prominent and erect bristles of various lengths and strength.

The *palpi* are similar in colour to the legs, slender and short; the cubital joint is short and bent downwards; the radial is still shorter, but has its fore extremity prominently produced into a rather long, strong, tapering apophysis, with a slightly hooked point when looked at in profile; about the middle of the outer side of this apophysis is a prominent somewhat tooth-like projection, and from the inner side of the joint projects another small pointed and slightly curved apophysis: the palpal organs are well developed, but not very complex, and directed outwards; at their base is a large red-brown and rather irregularly shaped corneous process, and at their extremity are several prominent black corneous points of different sizes.

The *falces* are similar in colour to the cephalothorax, tolerably long and strong, and nearly vertical; each has a strong curved but not very sharp tooth in front on its inner side towards the ex-

tremity, directed downwards, and below it, on the inner margin, are two or three minute ones.

The *maxilla* are similar in colour to the falces, rather long and strong, straight, and inclined towards the labium; on the outer side of each are two or three longish bristles springing from minute tubercles.

The *labium* is short and broad, rather pointed at its apex, and similar to the maxillæ in colour.

The *sternum* is of the ordinary heart-shape, tolerably convex, furnished with a few bristles, and of a yellow-brown colour.

The *abdomen* is short oval, and tolerably convex above; it is clothed thinly with hairs, and is of a yellowish brown colour tinged with olive.

Adult examples of the male were received from M. Simon, by whom they were found at Chaville near Paris, and also at Troyes.

ERIGONE DILUTA, sp. n. (Plate XLIV. fig. 6.)

Adult male, length  $\frac{2}{3}$  of a line.

The whole of the fore part of this Spider is of a bright straw or pale orange-yellow colour, the sternum, however, being a little suffused with sooty brown; the form of the cephalothorax is ordinary, the occiput and thoracic junction being on nearly the same level, and between them is a very slight depression; the height of the clypeus, which projects a very little forwards below, equals half that of the facial space.

The *eyes* are of tolerable size, rather large for the genus, and do not differ very greatly in size; they are seated on black spots in the usual position; the hinder row is the longest and most curved, the front row being nearly straight; the eyes of the hind central pair are divided from each other by an eye's diameter, but are further from each other than each is from the hind lateral on its side, to which last it is in fact almost contiguous; those of the fore central pair are smallest of the eight, dark-coloured, and very inconspicuous, contiguous to each other, and each is removed from the fore lateral on its side by but a very small interval; the interval between each fore central and the hind central eye on its side is equal to that which divides the eyes of the hind central pair.

The legs are neither very long nor strong; their relative length is 4, 1, 2, 3, and they are furnished pretty thickly with rather coarse hairs and slender bristles.

The *palpi* are short and slender; the cubital and radial joints are both very short; the latter is a little produced at its fore extremity on the upperside in a blunt-pointed form, but has no distinct projection or apophysis; each of these joints, besides some other hairs, has a single tapering black bristle projecting forwards from near the fore extremity of its upperside; the digital joint is not large, and its form is oval; the palpal organs are well developed but not very complex, consisting of a smooth oval whitish lobe and several corneous spines, one of which, of a pale colour and somewhat slender and sinuous form, issues from the base of the palpal organs, and, passing over their entire length, projects beyond their fore extremity.

The *falces* are tolerably long and strong, and somewhat divergent towards their extremity, near which on the inner margin are several very minute teeth.

The *maxillæ*, *labium*, and *sternum* are of ordinary form.

The *abdomen* is short oval and pretty convex above; its colour is a pale dull luteous brown, having a mottled appearance; and it is thinly clothed with rather coarse longish hairs.

This species is nearly allied to *E. viva* (p. 330); but, among other distinctions, the difference in the relative position of the eyes of the hinder row, as well as the structure of the palpal organs, and absence of the strong tooth in front of the *falces*, will readily distinguish it.

Adult males were received from M. Simon, by whom they were found at Troyes in France.

ERIGONE GROUVELLII, sp. n. (Plate XLIV. fig. 7.)

Adult male, length 1 line.

The *cephalothorax* of this Spider is of ordinary form; the profile describes a tolerably uniform gentle curve, with a very slight depression between the occiput and the thoracic junction, the caput not being elevated above the general level. The height of the clypeus is scarcely equal to half that of the facial space; the normal grooves and indentations are visible, but not very strongly marked; and some portions, if not the whole, of the surface, are very finely rugulose or striated with minute wrinkle-like markings. The colour of the cephalothorax is a deep yellow-brown, tinged with black; and the caput has a very few hairs along its median line.

The *eyes* are in the usual position, not very small, nor differing greatly in their relative size; the front row is rather the shortest; and both rows curve away from each other, forming a pretty regular oval figure; the eyes of the hinder row are very nearly equidistant from each other, the interval between the centrals being perhaps rather less than that which divides each from the lateral eye on its side; those of the fore central pair are near together but not contiguous to each other, the interval between them being about half that which separates each from the fore lateral on its side; those of each lateral pair are placed slightly obliquely on a tubercle; the interval between each of the hind central eyes and the fore central nearest to it is distinctly greater than that which divides the eyes of the hind central pair, and a little greater than that which separates each of these from the hind lateral on its side.

The *legs* are slender and of tolerable length; they are of a dull yellow colour, the femora being tinged with orange, and are furnished with hairs and a few slender spine-like bristles.

The *palpi* are short, moderately strong, of a duller hue than the legs, and furnished with a few hairs: the cubital and radial joints are very short; the former is bent and has a single strongish, tapering, prominent, slightly sinuous black bristle a little above its fore extremity on the upperside; the radial joint is stronger than the cubital, with one or two slight prominent points at its fore extremity on the upperside; the digital joint, which is of a dark black-brown

colour, is of tolerable size and has a slightly prominent lobe near the middle of its outer side, and above this, towards its base, there is a subangular prominence; the palpal organs are well developed, prominent, and complex; among other corneous processes is a largish one which projects backwards from near their base, and is of a somewhat bent, blunt-pointed, conical form.

The *falces* are long, strong, and divergent, considerably cut away or excavated towards their inner extremities, and a large portion of their front surface is thickly marked with small granulosities or slight tubercles, from some (if not all) of which there issues a single short bristly hair; on both the upper and underside of the extremity of each falx is a single tooth, between which two teeth the fang, which is long and strong, lies.

The *maxillæ* and *labium* are, like the *falces*, of a deep brown colour, tinged with yellowish, the colour of the *sternum* being much blacker.

The *abdomen* is of a rather slender oval form, black, glossy, and clothed sparingly with hairs; just above the spinners are several transverse curved folds or wrinkles in the skin, in a longitudinal series.

This Spider is very nearly allied to *Erigone rurestris*, Koch, = *E. fuscipalpis*, ej., = *Neriene gracilis*, Bl., + *N. flavipes*, Bl., and might be easily mistaken for it by its general characters of size, colour, and structure; but the tuberculous frontal surface of the *falces* and the corneous projection at the base of the palpal organs, particularly noted above and shown in figure 7, *b* & *c*, will, among other differences, serve to distinguish it at once.

A single example was received from M. Eugène Simon, by whom it was found on the Col de Natoia, between Embrun and Barcelonette, in 1872.

ERIGONE PÆTULA, sp. n. (Plate XLIV. fig. 8.)

Adult male, length rather less than 1 line.

The *cephalothorax* is of a dull yellow-brown colour, broadly radiated in the thoracic region with dark blackish brown lines, showing the direction of the converging indentations; an indistinct curved blackish line runs backwards from each of the lateral pairs of eyes, converging towards the occiput, and another, more strongly defined, runs backwards from the hind central eyes to the thorax; this line is dilated on the occiput into a somewhat arrow-headed marking, the point of which is directed backwards: the caput is large, the occipital region being the highest part of the cephalothorax, whence the profile line slopes both forwards and backwards without any depression; the cephalothorax has thus a humpbacked appearance; the clypeus is vertical, and its height is equal to half that of the facial space.

The *eyes* are in the ordinary position at the extremity of the front slope of the caput; they are small and do not differ greatly in their relative size. Those of the hinder row are equidistant from each other, the interval a little exceeding an eye's diameter; the front row is shorter than the hinder one, the eyes of each lateral pair being obliquely placed; those of the fore central pair are smallest of the eight and contiguous to each other, the interval between each of

them and the hind central eye nearest to it being rather less than that which divides those of the hinder row.

The *legs* are of tolerable length and slender; they are furnished with hairs and a very few fine spines or spine-like bristles. Their relative length appeared to be 4, 1, 2, 3, and they are of a dull brownish-yellow colour.

The *palpi* are slender, moderately long, and similar in colour to the legs; the cubital joint is short and bent downwards; the radial is stronger, gradually dilated towards its extremity, and has its fore extremity very slightly produced, ending in a blunt point; the digital joint is of moderate size; and the palpal organs are prominent and rather complex.

The *falces* are of ordinary length and strength; they are nearly vertical, rather lighter in colour than the cephalothorax, and armed with four small teeth on the inner sides towards their extremity.

The *maxillæ* and *labium* are of ordinary form, and similar to the falces in colour, that of the *sternum* being strongly marked and suffused with black.

The *abdomen* is of a rather slender oval form and moderately convex above; it is of a glossy black colour and sparingly clothed with fine hairs.

The female resembles the male in both form and colour, the teeth of the falces, however, being longer and stronger; the form of the genital aperture is simple but characteristic.

This species is allied to *Erigone rurestris*, Koch; but the hump-backed form of the cephalothorax distinguishes it at a glance.

Adults of both sexes were received from Mr. Eugène Simon, by whom they were found in the French Alps, at Monitier, Lautares, in 1873.

#### DESCRIPTION OF PLATE XLIV.

Fig. 1. *Erigone pabulatrix* ♂ & ♀, p. 324.

*a*, profile; *b*, caput and falces, from the front; *c*, left palpus (♂), from the outer side; *d*, genital aperture of ♀; *e*, ditto, in profile; *f*, natural length of ♂.

2. *Erigone serrata* ♂, p. 325.

*a*, profile; *b*, caput and falces, from the front; *c*, left palpus, from the front and rather on the outer side; *d*, natural length of Spider; *e*, ditto of *Erigone sylvatica*, a very closely allied species.

3. *Erigone nemorivaga* ♂ & ♀, p. 326.

*a*, profile; *b*, caput and falces (♂), from the front; *c*, right palpus (♂), from inner side and above; *d*, left palpus (♂), from inner side and in front; *e*, left leg of first pair, from the outer side (♂); *f*, genital aperture (♀); *g*, natural length of ♂.

4. *Erigone corallipes* ♂ and ♀, p. 328.

*a*, profile; *b*, caput and falces, from the front; *c*, right palpus (♂), from inner side and in front; *d*, ditto, from outer side and underneath; *e*, genital aperture (♀); *f*, natural length (♂).

5. *Erigone viva* ♂, p. 330.

*a*, profile; *b*, caput and falces, from the front; *c*, right palpus, from outer side; *d*, portion of left palpus, from inner side; *e*, ditto, from inner side and behind; *f*, natural length of Spider.

6. *Erigone diluta* ♂, p. 331.

*a*, profile; *b*, caput and falces, from the front; *c*, right palpus, from



inner side; *d*, left ditto, from underneath on inner side; *e*, natural length of Spider.

Fig. 7. *Erigone grouvellii* ♂, p. 332.

*a*, profile; *b*, caput and falces, from in front; *c*, right palpus, from inner side in front; *d*, natural length of Spider.

8. *Erigone petula* ♂ & ♀, p. 333.

*a*, profile; *b*, caput and falces (♂), from the front; *c*, left palpus (♂), from outer side; *f*, portion of ditto, from inner side in front; *d*, genital aperture (♀); *e*, natural length (♂).

LIST OF KNOWN SPECIES OF ERIGONE COMPRISED IN THE  
VARIOUS COLLECTIONS RECEIVED FROM M. SIMON.

WALCKENAËRA, Blackw.

- Erigone simonii*, Cambr. Paris.
- *precox*, Cambr. Troyes.
- *pallens*, Cambr. Briançon, Sappey, and Le Monitier, Hautes-Alpes.
- *depressa*, Bl. Corsica.
- *brevipes*, Westr. Cols des Ayes, Hautes-Alpes, France.
- *insecta*, L. Koch. Troyes.
- *unicornis*, Cambr. Troyes.
- *monoceros*, Wid. Glacier du Casset, Troyes, and Corsica.
- *scabricula*, Westr. Paris.
- *elegans*, Cambr. Paris.
- *beckii*, Cambr. Troyes.
- *pusilla*, Westr. Sappey (near Grenoble).
- *humilis*, Bl. Corsica.
- *cristata*, Bl. Savines.
- *fuscipes*, Bl. Dieppe.
- *avicula*, L. Koch. Le Monitier, Hautes-Alpes.
- *pumila*, Bl. Troyes.
- *parallela*, Bl. Paris and Hautes Alpes.
- *obscura*, Bl. Troyes.
- *latifrons*, Cambr. Sappey.
- *fastigata*, Bl. Near Paris.
- *capito*, Westr. Paris and Bourg d'Oisans.
- *cucullata*, C. Koch. Grenoble.
- *blackwallii*, Cambr. Col de Buffère, Casset, Hautes-Alpes.
- *nemorialis*, Bl. Troyes.
- *straminea*, Menge. Faillefeu, Basses-Alpes.

NERIENE, Bl.

- Erigone sila*, Cambr. Paris, and Le Galivier, Hautes-Alpes.
- *bicuspis*, Cambr. Paris.
- *refusa*, Westr. Paris, Digne (Basses-Alpes), and Troyes.
- *herbigrada*, Bl. Sappey.
- *intercepta*, Cambr. France.
- *alpigena*, L. Koch. Le Monitier.
- *rubens*, Bl. France.
- *isabellina*, C. Koch. France.
- *fuscipalpis*, C. Koch. Various localities in France.
- *penicillata*, Westr. Troyes.
- *sundevallii*, Westr. Orne (Normandy) and Corsica.
- *subtilis*, Cambr. Col de Buffère, Hautes-Alpes.
- *agrestis*, Bl. Sappey.
- *vigilax*, Bl. Eychauda, Buffère, Lac Blanc, Jura.
- *pygmaea*, Bl. Bourg d'Oisans.
- *neglecta*, Cambr. Troyes.
- *vagans*, Bl. Cols des Ayes, Hautes-Alpes.
- *pallipes*, Cambr. Villers sur mer, Normandy.
- *brevipalpis*, Menge. Sappey.

4. Sketches of the Spermatozoa of *Petromyzon*.

By GEORGE GULLIVER, F.R.S.

[Received April 7, 1875.]

In my paper "On certain Points in the Anatomy and Economy of the Lampreys," published in 1870 (P. Z. S. 1870, p. 844), there is an engraving of the spermatozoa of *Petromyzon planeri*. But I know not that those of *P. marinus* have ever been described or depicted; and as they differ curiously in the two species, sketches of them are here given.

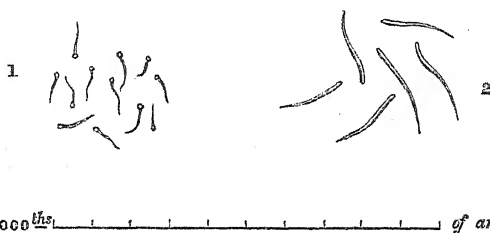


Fig. 1. Spermatozoa of *Petromyzon marinus*; fig. 2. Spermatozoa of *P. planeri*. The scale is divided into ten parts, each one of which stands for  $\frac{1}{4000}$  of an English inch.

The spermatozoa of *P. marinus*, notwithstanding the great size of the species, are much the smallest, and have a distinct and rounded head. Their mean length is about  $\frac{1}{4000}$  inch, and their thickness  $\frac{1}{48000}$ . They were obtained from a fish 32 inches in length and three pounds in weight, taken on the 12th of May, 1874, in the river Stour, near Sturry Mill, about two miles below Canterbury. The milt, which distended the whole abdomen from the pericardium to the anus, was a soft pulpy mass chiefly composed of a creamy semen, and so rich in, and crowded with, spermatozoa of such minuteness that they were with difficulty distinguishable; and it was not before the semen had been much diluted and placed under Powell and Lealand's  $\frac{1}{8}$  objective that a good view of them was obtained. Under a lower power, especially in the pure semen, nothing more than congeries of indistinct rounded points appeared, like those which I have described in the 'Proceedings' of this Society (P. Z. S. 1842, p. 99), as the "molecules of the semen." In short, unless great care be taken, the spermatozoa in the ripe testis are so very faint, minute, and abundant, that they are likely to escape detection.

But the spermatozoa of the little *Petromyzon planeri* are much larger and more easily seen. They are club-shaped, without a distinct head, and have an average length of  $\frac{1}{2000}$  inch, and a thickness of  $\frac{1}{30000}$ . They were obtained in April from a fish 6 inches in length and 2 drachms in weight. Further details concerning the generative organs of both sexes are given in the paper first quoted in the present communication.

5. Contributions to a History of the Accipitres, or Birds of Prey. By R. BOWDLER SHARPE, F.L.S., F.Z.S., &c., of the Zoological Department, British Museum. Notes on the rarer Accipitres of Australia.

[Received April 19, 1875.]

The specimens which I have the pleasure of exhibiting before the Society to-night have all been collected in the interior of Queensland by Mr. J. B. White, a gentleman whom Mr. Ramsay has already introduced to the notice of ornithologists as the discoverer of the egg of *Chlamydodera maculata* (*vide* P. Z. S. 1874, p. 605). During a recent visit to England Mr. White submitted his series of Accipitres to me; and I found so many interesting birds among them, many in stages of plumage hitherto unknown and undescribed, that I have put together a few notes on the most important species.

ERYTHROTRIORCHIS RADIATUS (Lath.).

*Urospizias radiatus*, Sharpe, Cat. B. i. p. 159.

Mr. White has an adult male and a young female of this interesting bird; and it is quite evident that my measurements, taken from a supposed female bird in the Museum collection, were wrongly given by me in the 'Catalogue.' Mr. White's birds measure as follows:—

♂ ad. Total length 20·5 inches, culmen 1·35, wing 14·9, tail 9·2, tarsus 3.

♀ jun. Total length 24·5 inches, culmen 1·6, wing 16·9, tail 10·5, tarsus 3·25.

*Young female.* Larger than the male, as will be seen by the measurements, and immensely more powerful in the talons. Above tolerably uniform brown, the hind neck mottled with white bases to the feathers, a few of the feathers on the hind neck and upper wing- and tail-coverts showing the characteristic bright rufous margins; median and greater wing-coverts shaded with ashy grey, and barred across with dark brown, exactly like the secondaries, which are outwardly greyish with four distinct bands of dark brown, the tips of the feathers whitish; the primary coverts and primaries greyish, barred with blackish, about nine bands being distinguishable on the latter; on all the feathers of the rump and upper tail-coverts are indications of concealed greyish white cross bars, many of the latter being also tipped with white; tail-feathers grey, narrowly tipped with white and crossed with nine bands of blackish brown, increasing to ten in number on the outer tail-feathers; sides of face brown, the lower ear-coverts streaked with white; cheeks and throat white, distinctly streaked with blackish brown; all the rest of the under surface broadly streaked with blackish brown, the chest washed with tawny; the centre of the body white, the flanks greyish, many of the feathers margined with bright rufous; thighs entirely bright rufous, entirely uniform; vent and under tail-coverts whitish, with narrow blackish

shaft-lines, the vent-feathers slightly washed with bright rufous, the under tail-coverts mottled with ashy frecklings; under wing-coverts bright rufous, with broad central arrow-head markings of black, the lower series grey, barred with blackish brown, exactly resembling the inner lining of the quills.

Mr. Gurney has pointed out to me an error that I made in adopting this species as the type of Kaup's genus *Urospizias*, whereas Kaup intended his type of that genus to be the *Astur radiatus* of Temminck (*nec* Lath.)=*A. approximans*. I overlooked this by some mistake; and as this Red Harrier Buzzard is really generically distinct, I adopt the name of *Erythrotriorchis*, with which Mr. Gurney proposes to supplant *Urospizias* of my 'Catalogue.'

LOPHOICTINIA ISURA (Gould): Sharpe, Cat. p. 327.

The receipt of a specimen in Mr. White's collection shows that the bird supposed by me to be the young (p. 327) is not really immature; and I subjoin a description of a very young bird, which I now exhibit.

Above purplish black, broadly tipped with tawny rufous, shading off into buff on the extreme margin; lower back and rump pale brown, broadly tipped with tawny rufous, especially on the under tail-coverts, which are barred and mottled with darker brown, being whitish at the base and for the greater part of the outer web; tail slaty grey, tipped with buffy white and barred with six blackish bands, the subterminal one broader; upper wing-coverts purplish brown, broadly barred with tawny rufous, particularly broad on the outermost of the least series, which are mesially streaked with blackish brown, the greater coverts whitish near the base and barred with the same on the inner web; primary coverts uniform purplish brown, tipped with tawny; quills purplish black, tipped like the coverts, the primaries inclining to slaty grey and barred with blackish on the inner webs; entire head, neck, and underparts bright tawny, the feathers centred with black streaks, narrower on the throat and chest, and disappearing on the abdomen and flanks; frontal feathers and chin indistinctly whitish; ear-coverts more thickly streaked with blackish, giving them a dingy appearance; upper wing-coverts coloured like the breast, the lowest series ashy black, inclining to greyish white at base, and resembling the inner lining of the quills.

NISAETUS MORPHNOIDES (Gould): Sharpe, Cat. i. p. 254.

The bird figured by Mr. Gould and described by him as adult is most probably the young. At all events it is of the same plumage as the brown specimens of the Booted Eagle of Europe, which are generally shown to be immature. Mr. White has now sent me the adult bird, a skin of which he has very kindly presented to the Museum; and he tells me that the brown birds are far rarer than the white-breasted ones. As might be expected, the present specimen much resembles an ordinary white-breasted *N. pennatus*; but it has the unfailing character of the barred quill-lining by which I first

distinguished the species, and it has a tolerably distinct crest. I subjoin a description of this adult bird :—

*Adult.* Above clear brown, with a purplish shade, many of the feathers with paler edgings, especially the upper wing-coverts; spurious quills and primary coverts uniform purplish black, with a very slightly indicated whitish tip; quills purplish brown, barred across with black on the inner web, these black bars more distinct on the secondaries, which are paler and are barred across, the tips being conspicuously white, the innermost secondaries uniform pale brown like the back; lower back and rump rather darker brown; the upper tail-coverts very light, tipped and barred externally with white; tail grey, tipped with white, and crossed with eight blackish bars, the subterminal one rather the broadest; forehead whitish; crown of the head purplish black, the feathers lanceolate and forming an occipital crest; sides of the face and neck all round tawny-coloured, with mesial black shaft-streaks to all the feathers; the ear-coverts rather more dingy brown but narrowly streaked with black in the same manner, these streaks much broader on the cheeks and forming a distinct moustache; under surface of the body white, the feathers streaked with black on the throat and chest, these streaks disappearing gradually on the abdomen; many of the throat- and breast-feathers washed with pale tawny, as also the flanks—the abdomen, thighs, and under tail-coverts having very few of these markings and being nearly uniform white; upper wing-coverts white, with a few brown streaks, the innermost deep chestnut, streaked with black. Total length 21 inches, culmen 1·65, wing 15·7, tail 9·7, tarsus about 2·85.

GYPOICTINIA MELANOSTERNA (Gould): Sharpe, Cat. B. i. p. 335.

A specimen of this extremely rare Kite is in the collection; and I have the pleasure of exhibiting it to the Society. It will be seen from the tarsus with its scaled hinder aspect and its long wings that the bird is a Kite and not a Buzzard at all. Mr. Gould's plate in the 'Birds of Australia' does not show these peculiarities, and gives a wrong idea of the bird in consequence.

Besides the Hawks above mentioned, Mr. White collected specimens of *Falco subniger*, *F. hypoleucus*, *F. lunulatus*, and the rarer *Striges*, such as *Strix tenebriosa*, &c.

6. On the Disposition of the Deep Plantar Tendons in different Birds. By A. H. GARROD, B.A., F.Z.S., Fellow of St. John's College, Cambridge, Prosector to the Society.

[Received March 30, 1875.]

The arrangement of the tendons in the palm of the hand and the sole of the foot among the Mammalia is a subject of great intricacy, as

may be inferred from the comparison of the dissections of different animals whose anatomy has been sufficiently investigated. Among birds peculiarities in the disposition of the plantar tendons has already attracted the attention of Prof. C. J. Sundevall, who, as is well known, divides the Passeres off from all other orders, and includes *Upupa* with them, because in them, and in them only, the tendon of the *flexor longus hallucis* muscle is quite independent of that of the *flexor perforans digitorum*; whilst in other birds the former joins the latter, so preventing the two from being quite independent in their action. All other descriptions which I have seen of special dissections have been confirmatory of this view; and my own observations, with but a slight exception in the case of *Botaurus*, to be mentioned below, support Prof. Sundevall's separation off of the Passeres together with *Upupa* on this particular character. My dissections, however, have shown me that there is still more to be learnt from the plantar tendons, and that the large mass of birds which all agree in that the two above-mentioned deep flexors blend together, present among themselves peculiarities as important as that which so definitely characterizes the Passeres. To describe and to endeavour to show the bearing of these differences are the objects of the present paper.

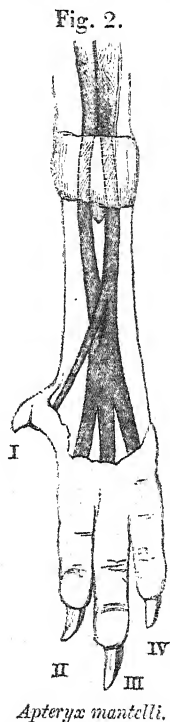
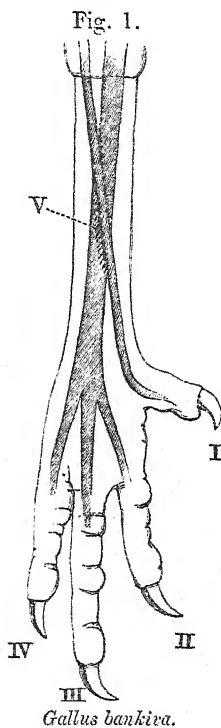
In birds generally, whatever the number of their toes, there are two muscles whose fleshy bellies are situated in the leg proper (that is, between the knee and the ankle), deep, and just behind the tibia. These muscles arise, one from almost the whole of the posterior surface of the tibia and from the fibula, in a bipenniform manner, and the other from the inferior surface of the horizontal femur, just behind the outer genual articular condyle. The former is termed the *flexor perforans digitorum pedis*, because its terminal tendons perforate those of the more superficial flexors on their way to the ungual phalanges of their respective toes; and the latter is termed the *flexor longus hallucis*, because there is generally a shorter muscle to the same digit.

These two muscles descend to the ankle (the joint between the tibio-tarsus and the tarso-metatarsus) side by side; they run behind it, in the fibro-cartilaginous or osseous mass which, in birds, is always found at the posterior part of the upper end of the tarso-metatarsus, in two canals, deeper than any of the other flexor tendons; and in these canals there is always a definite relation between them. Sometimes the tendons are side by side; and then it is always that of the *flexor longus hallucis* which is the external of the two, the osseous vertical ridge, which is nearly always seen in the dry bone, separating them. Sometimes, however, one is superficial or, in other words, posterior to the other. When this is the case it is always the *flexor perforans digitorum* which is the deeper. In the Swifts, for instance, the *flexor longus hallucis* quite covers the *flexor perforans digitorum*; but in most Parrots, as may be seen by the disposition of the osseous canals in the dry tarso-metatarsus, that for the former muscle is external as well as superficial, only partially covering it.

These relations are constant, and must be always borne in mind

in all attempts to identify the muscles. From these it can be inferred, as is verified by dissection, that the tendon of the *flexor longus hallucis* crosses its companion superficially on its way from the ankle to its insertion in the hallux.

Just before, or just at the commencement of, the sole of the bird's foot (near the joint between the metatarsus and the phalanges), these two tendons generally split up to supply the toes. By far the majority of the families of birds agree in the distribution of the terminal tendons, conforming to one common type. This typical arrangement must be first described. The common Fowl (*Gallus bankiva*) is a very good example. The accompanying diagram (fig. 1) will



assist in explaining it. The tendon of the *flexor longus hallucis* descending on the outer side of the tendon of the *flexor perforans digitorum*, crosses it superficially in its downward and inward course to the lower surface of the base of the hallux, whence it traverses the flexor surface of that digit to the base of the ungual phalanx, at which spot it is inserted. The *flexor perforans digitorum* continues down to the sole of the foot as a single tendon, where it immediately splits into three parts, one to the ungual phalanx of each of the three anteriorly directed digits. Opposite the lower part of the tarso-

metatars the *flexor longus hallucis* sends downwards a fibrous vinculum (V) which joins the *flexor perforans digitorum* tendon just before it commences to trifurcate. In all cases this vinculum is always directed downwards from the hallux-muscle to the digits-muscle, so that, when the tendon of the *flexor perforans digitorum* alone is pulled upon, the three anterior digits alone are flexed; but when the *flexor longus hallucis* is put in action, the digits as well as the hallux are simultaneously flexed.

The proportion borne by this vinculum to the main tendon of the *flexor longus hallucis* varies considerably. In some birds it is com-

Fig. 3.

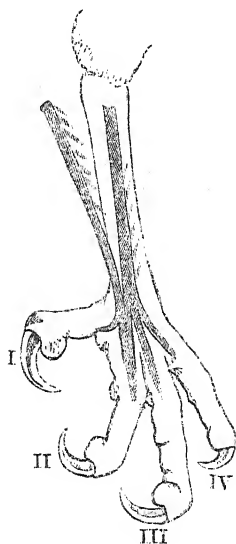
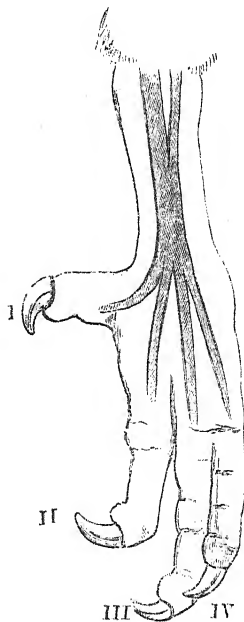
*Timunculus alaudarius.*

Fig. 4.

*Buceros rhinoceros.*

paratively feeble and insignificant; whilst in others, with but a small hallux, it is much larger than the hallucial moiety, and seems to be the main continuation outwards of the insertion of the muscle into that of the *flexor perforans digitorum*, the slip to the great toe being but small compared with it. In the Dorking Fowl the *flexor longus hallucis* tendon splits into two (after it has given off the vinculum to the *flexor perforans*), one resulting portion going to the normal hallux and the other to the supplementary toe, which is therefore a hallux also, as is generally supposed.

This manner of distribution of the deep plantar tendons, which is that found in a great number of birds, may be summarized as follows:—The *flexor perforans digitorum* splits opposite the meta-



tarso-phalangeal joint into three tendons, one running to the ungual phalanx of each of the three anteriorly directed toes. The *flexor longus hallucis* is inserted into the ungual phalanx of the hallux, but it sends downwards near the middle of the tarso-metatarsus a vinculum to join the tendon of the *flexor perforans digitorum* just before the trifurcation of that muscle (figs. 1 and 7).

This condition is found in the following birds which I have examined:—

<i>Gallus bankiva.</i>	<i>Baza lophotes.</i>
<i>Megacephalon maleo.</i>	<i>Syrnium aluco</i> (vinculum very broad).
<i>Fulica atra.</i>	<i>Leptoptilus argala.</i>
<i>Musophaga violacea.</i>	<i>Ardea sumatrana</i> (vinculum very slender).
<i>Schizorhis africana.</i>	— <i>cinerea</i> (vinculum scarcely exists).
<i>Crotophaga sulcirostris.</i>	<i>Canceroma cochlearia.</i>
<i>Phaenicophaeus, sp.?</i>	<i>Geopelia cuneata.</i>
<i>Eudynamis orientalis.</i>	<i>Ibis rubra.</i>
<i>Cuculus canorus.</i>	<i>Platalea ajaja.</i>
<i>Nestor notabilis.</i>	<i>Eurypyga helias.</i>
<i>Chrysotis festiva.</i>	
— <i>ochrocephala.</i>	
<i>Ara chloroptera.</i>	

In *Ardea cinerea* and in *A. sumatrana*, here mentioned, the vinculum is stated to be extremely feeble. In *Botaurus stellaris* this condition is carried a step further, the vinculum being quite wanting. Prof. Sundevall states that such is the case only in the Passeres and in *Upupa*; here, however, is a slight exception to that generalization.

Frequently the vinculum above referred to is so considerable in strength that it makes the *flexor longus hallucis* appear to fuse with the *flexor perforans digitorum*, and only to send a slip before doing so to the hallux. This condition is evidently but an inconsiderable modification upon the previously described typical arrangement (fig. 2, p. 341). It is, however, a stepping-stone to others, which it assists in explaining. It is found in the following birds, which I have dissected (it will be noticed that they have the hallux comparatively insignificant):—

<i>Apteryx mantelli.</i>	<i>Cygnus nigricollis.</i>
<i>Nothura maculosa.</i>	<i>Podiceps minor.</i>
<i>Chenalopex ægyptiacus.</i>	<i>Phalacrocorax carbo.</i>

In many of the Accipitres diurnæ a slight modification of this arrangement is observed. The *flexor longus hallucis* divides into two moieties opposite the lower end of the tarso-metatarsus, one of which runs to the hallux. The other part is the representative of the vinculum of the above-mentioned birds; it is peculiar, however, in that, instead of joining the tendon of the *flexor perforans digitorum* before it is distributed to the anterior toes, it mostly runs down to blend with the slip which is associated with the inner of these (digit 2) only (fig. 3). This condition I have observed in

<i>Haliaëtus albicilla,</i>	<i>Tinnunculus alaudarius.</i>
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In *Geranoaëtus aguia* and in *Polyborus brasiliensis*, besides the

special tendon from the hallux-muscle to the second digit, there is a broad thin vinculum present, as in *Gallus*. In the Accipitres Diurnæ the arrangement of the tendons therefore differs in different groups—in *Baza* their distribution being quite normal, that is as in the first-described manner; in *Polyborus*, *Haliaëtus*, *Tinnunculus*, and *Geranoëtus* this condition is combined with a special extra tendon to the second digit, which greatly increases its power of flexion. The arrangement observed in the Cathartidæ is in no way allied to any of these, and adds another important point to the many now known to separate them off entirely from the Accipitres veræ.

The next arrangement to be described is a very different one. The two deep flexors descend beyond the ankle-joint independently, as usual; after passing which, generally about one third down the tarso-metatarsæ, they blend completely, *before* any slip has been given off. From the conjoined tendon thus formed the tendons of distribution spring, four in number, one to the hallux and others to each of the three anteriorly directed toes (fig. 4, p. 342), that to the former being generally separated off before any of the others.

Among Homalognatous birds the only group in which I have observed this condition is that of the Cathartidæ—both *Cathartes atratus* and *Sarcorhamphus gryphus* possessing it, and so differing entirely from their supposed allies the diurnal Accipitres. Among Anomalognatous birds the arrangement is very commonly found; I have seen it in

*Coracias garrula*,  
*Buceros rhinoceros*,  
*Steatornis caripensis*,

*Podargus cuvieri*,  
*Caprimulgus europæus*,  
*Cypselus alpinus*.

On looking at the plantar tendons thus arranged, without further dissection, the slip to the hallux from the conjoined deep flexor tendon seems to spring from its inner (that is, hallucial) side; whereas, from what has been said above, the long flexor of the hallux is situated external to the common flexor, at the ankle-joint.

Further, in these birds, on straining upon the distal hallux slip with one hand, at the same time that the distal slips to the remaining toes are held in the other, the two elements of the conjoined tendons tend to divide up in the direction of the ultimate fibres; and in doing so the line of rupture always develops in such a way that it leaves the thus further-separated hallux slip still on the inner side in connexion with the main *flexor perforans* tendon.

A natural condition, like this thus artificially produced one, is found in some birds closely allied to those in which the last described arrangement obtains. It is found in *Momotus lessoni*, *Dacelo gigantea*, and *Merops apiaster*. In them the tendons of the *flexor longus hallucis* and of the *flexor perforans digitorum* pass down beyond the ankle-joint in the typical manner, the former external to the latter as usual. Opposite the upper end of the tarso-metatarsæ the *flexor perforans digitorum* gives off from its *inner* side the flexor slip which supplies the hallux, the majority of the tendon descending as usual towards the foot. Opposite the middle

of the tarso-metatarsus it is joined by the tendon of the *flexor longus hallucis* on its outer side, whereupon the conjoined tendon splits into three divisions to supply the three anterior toes (*vide* fig. 5).

The peculiar conformation in the foot of the *Trogonidæ* is associated with an equally abnormal arrangement of the plantar tendons, which I have found in *Trogon puella* and in *Pharomacrus mocinno*. In these birds the tendon of the *flexor longus hallucis* is situated, as it

Fig. 5.

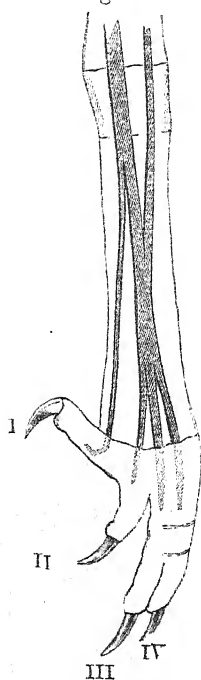
*Momotus lessoni.*

Fig. 6.

*Trogon puella.*

ought to be, external to the *flexor perforans digitorum*; it also crosses it superficially, opposite about the middle of the tarso-metatarsus, sending down a slender vinculum in the normal manner. The peculiarity is in the ultimate destination of the tendons, the *flexor longus hallucis* and the *flexor perforans digitorum* each dividing into two near the metatarso-phalangeal articulation, the two portions of the former tendon running to the hallux and digit 2, the two of the latter to digits 3 and 4 (*vide* fig. 6). This arrangement is not found in any other group of birds, as far as my experience goes.

Besides the three last peculiar arrangements of the tendons, which I have not found elsewhere described, there is another still more peculiar and unexpected. I have observed it in all the Anomalo-

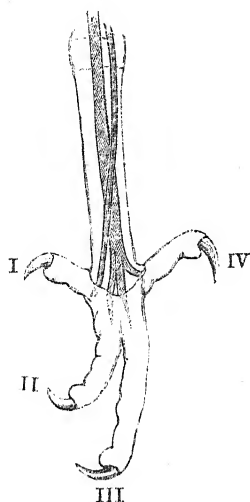
gonatous birds with scansorial feet which I have examined, and in them only, it being present in

*Ramphastos ariel*,  
*Megascops asiatica*,  
*Gecinus viridis*,

*Tiga javanensis*,  
*Galbula albirostris*,  
*Urogalba paradisea*.

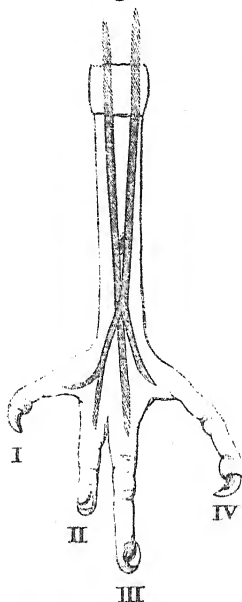
It is represented in fig. 8. The two tendons descend behind the ankle as usual, having their origins typical. There is nothing peculiar till they have descended two thirds down the tarso-metatarsus. About opposite the middle of that bone the *flexor longus hallucis* sends a vinculum downwards as in the Fowl, to join the tendon of the *flexor perforans digitorum*. Just above the metatarso-phalangeal articulation the tendons become arranged for distribution in a most uncommon manner. The tendon of the *flexor perforans digitorum* does not split up, but runs to one digit only, namely the third toe,

Fig. 7.



*Crotophaga sulcirostris*.

Fig. 8.



*Megascops asiatica*.

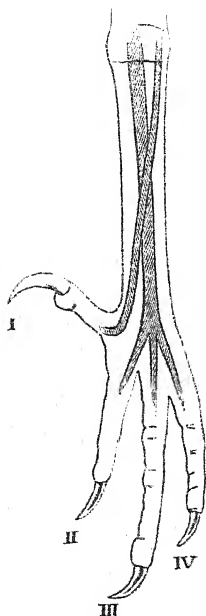
which is the outer of the two that are directed forward. It is covered superficially by the *flexor perforans digitorum*, just as that latter muscle is splitting up to be distributed to the hallux as well as to digits 2 and 4. In these birds we have, therefore, the *flexor longus hallucis* arising from the lower surface of the femur only, running through the ankle at the outer side of the other deep tendon, and sending a vinculum downwards—all of which are

special characters of that muscle only, it being distributed to three toes, whilst the *flexor perforans digitorum* only supplies one.

The birds with scansorial feet thus fall into two divisions, according to the arrangement of their plantar tendons, these being normal in the *Psittaci* and *Cuculidæ*, whilst they are extremely peculiar in the *Picidæ*, *Ramphastidæ*, *Capitonidæ*, and *Galbulidæ*. In my paper on the Classification of Birds\*, the presence or absence of the *ambiens* muscle made me feel justified in placing the *Psittaci* and *Cuculidæ* among my HOMALOGONATÆ, at the same time that the *Pici*, *Ramphastidæ*, *Capitonidæ* and *Galbulidæ* are arranged among the ANOMALOGONATÆ. These new observations are therefore strongly in favour of the naturalness of the classification proposed.

There is only one other point to be considered on the present occasion, as far as this question is concerned. It is the distribution of these tendons in birds which do not possess the hallux, or in which

Fig. 9.



A typical Passerine Foot.

there is no long flexor tendon to that digit when it is present. In all these cases both the *flexor longus hallucis* and the *flexor perforans digitorum* muscles are present and well developed, only they blend completely opposite the upper part of the tarso-metatarsus to form a single common tendon to be distributed, on its splitting up, to the anterior toes—to the two of *Struthio*, the three of *Rhea*, *Otis*,

\* P. Z. S. 1873, p. 626, and 1874, p. 111 *et seq.*

&c. Dr. Alix\* has described how that, in the common Swan (*Cygnus olor*), there is no long flexor tendon to the small hallux. I have not examined that species; but there is undoubtedly a small one in *C. nigricollis*, *C. atratus*, and in all the other Anserine birds I have examined, as above mentioned. However I have found this tendon to the hallux wanting in

*Parra africana*,  
*Chauna derbiana*,

*Pygosceles papua*,  
*Podiceps minor*.

Professor C. Sundevall has shown† that in the Passeres and in *Upupa epops* the tendons of the *flexor longus hallucis* and the *flexor perforans digitorum* are quite free from one another, not being united by any vinculum. In all the Passeres which I have examined my observations agree with these generalizations. However, the same condition maintains in *Botaurus stellaris* and almost in *Ardea cinerea*, where the vinculum is scarcely more than a single fibre (*vide* fig. 9).

#### DESCRIPTION OF FIGURES.

In all the figures the numbering refers to the digits I, II, III, IV, representing the hallux, second, third, and fourth digits respectively. In all, the deep plantar tendons are alone represented, and these from their plantar aspect, the hallucial tendon being the outer of the two at the heel-joint.

Fig. 1. Left foot of *Gallus bankiva*; V, vinculum running downwards from the outer hallucial tendon to the inner digital common tendon.

2. Right foot of *Apteryx mantelli*.
3. Right foot of *Tinnunculus alaudarius*.
4. Right foot of *Buceros rhinoceros*.
5. Right foot of *Momotus lessoni*.
6. Arrangement of the tendons in the left foot of *Trogon puella*.
7. Right foot of *Crotophaga sulcirostris*.
8. Right foot of *Megalema asiatica*.
9. Right foot of a Passerine bird.

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May 4, 1875.

E. W. H. Holdsworth, Esq., in the Chair.

The following report on the additions to the Society's Menagerie during the month of April 1875 was read by the Secretary:—

The total number of registered additions to the Society's Menagerie during the month of April 1875 was 157, of which 14 were by birth, 72 by presentation, 54 by purchase, 11 by exchange, and 6 were received on deposit. The total number of departures during the same period by death and removals was 94.

The most noticeable additions during the month were:—

1. A Syrian Bulbul (*Pycnonotus xanthopygos*, Hempr. et Ehr.), presented by E. T. Rogers, C.M.Z.S., April 12th. This species is new to the Society's collection.

2. A collection of small Finches from South America, purchased April 19, amongst which are examples of several species (*Spermophila*

\* Essai sur l'appareil locomoteur des Oiseaux. Paris, 1874, p. 464.

† Methodi naturalis avium disponendarum tentamen (Stockholm, 1872), and elsewhere.

*cærulescens*, *S. aurantia*, *S. lineola*, and *S. hypoleuca*) not previously exhibited.

3. An albino of the Common Macaque (*Macacus cynomolgus*) or of the Philippine form of the species (*M. philippinensis*), brought from Samar, Philippines, and presented by Mr. J. Ross, April 23rd.

We have now a pair of these albino Monkeys in the Menagerie.

Mr. Slater exhibited and made remarks on the skin of a chick of a Cassowary (supposed to be *Casuarus picticollis*, Slater, P. Z. S. 1875, p. 84, Plate XVIII.) which had been transmitted to him for examination by Dr. George Bennett, F.Z.S., of Sydney. The bird had been obtained alive from the natives in Milne Bay, New Guinea, by Mr. Godfrey Goodman, Staff-Surgeon, R.N., when on the 'Basilisk' in 1873. It had died on board; and its skin had been preserved by Mr. Goodman.

The bird was still in the first down-plumage, and was generally of a pale buffy brown with the head above rufescent. The back was dark with one median and on each side two lateral broad stripes of pale brown. These stripes ran regularly parallel down the whole length of the back. The whole length of the skin from the beak to the tail was 10·5 in., of the tarsus 2·9, and of the bill from the gape 2·5.

Mr. Slater proposed to deposit this specimen, as requested by Mr. Goodman, in the British Museum.

Prof. Newton exhibited two specimens of Ross's Gull (*Rhodostethia rossi*) received from Greenland by the Royal Museum of Copenhagen.

Professor Newton, M.A., F.R.S., F.Z.S., exhibited tracings of some unpublished sketches of the Dodo and other extinct birds of Mauritius, remarking:—

"In the summer of 1868 Mr. Hessells, an assistant in the Public Library of the University of Cambridge, informed me that, having lately been in Holland, he had there been shown the original manuscript of a journal kept during the voyage of Wolphart Harmanszoon to Mauritius in 1601–1602, which was embellished by drawings of the Dodo (*Didus ineptus*) and other birds. The text of the journal I was told had been published, but not so these sketches. I at once wrote to Professor Schlegel, acquainting him with the fact; and he replied that his attention had been already drawn to this very interesting volume, which, if I am not mistaken, belongs to a library at Utrecht. He further told me that among the birds represented were species which could be easily identified as *Aphanapteryx broecki* and *Psittacus mauritanus*, and added that he was preparing a memoir on the subject.

"I have naturally been most anxious ever since to see these sketches or copies of them; but expecting that Prof. Schlegel would shortly carry out his intention, I was careful not to interfere with his design, and contented myself with inserting a short notice of the fact in the 'Ibis' for 1868 (pp. 503–504). I have, however, waited in

vain for the promised memoir. A few days ago M. Alphonse Milne-Edwards was so good as to send me tracings of the sketches, which he had obtained during a recent visit to Leyden; and I now have the pleasure of showing them to the Members of the Society present.

"The figures of the Dodo do not call for much remark; but no one can look at them without perceiving that, rough as they are, they must have been drawn by no common hand and evidently from the life. The various attitudes in which the bird is represented certainly assist us in forming a conception of what it must have been like.

"The sketch of *Aphanapteryx* would seem to have been taken from a freshly-killed bird, as it might have lain on the ground before the linner. But this also, so far as I can judge, does not add to our knowledge of this remarkable form, which we have already so well depicted by Hoefnagel.

"The remaining tracing is of more importance. I think Prof. Schlegel is clearly right in assigning it to *Psittacus mauritianus*, Owen\*, which we only know from a few bones. The most extraordinary feature it presents is perhaps the frontal crest, of a shape quite unlike that found, so far as I am aware, in any other form of Parrot, rising as it does from the very base of the bill and terminating before it reaches the occiput, which appears to be flat and smooth. No sooner did I see this singular crest than it struck me that the figure of a bird given in one of the plates to Van Neck's Voyage, which has always been a puzzle to everybody, must have been intended for this species. The plate was copied in *fac-simile* for Strickland's work†; and the description of this particular figure (5) is given by him thus:—

"5 est un oiseau de nous nommé Corbeau Indien, ayant la grandeur plus d'une fois que les Parroquets, de double et triple couleur."

"He, it is true, says of it 'A species of *Buceros*' (p. 10, note); but no species of that genus, or any thing like it, has been seen from Mauritius, and I cannot help thinking that the figure must refer to *P. mauritianus*. If the sketch I now exhibit can be trusted as to the shortness of the bird's wings, it is very suggestive.

"Professors Owen (*loc. cit.*) and A. Milne-Edwards (Ann. Sc. Nat. ser. 5, vi. pp. 91–111) have pointed out several osteological characters which distinguish this Parrot; and the latter has shown that it cannot be referred to any of the established genera or subgenera of *Psittaci*. I would therefore propose the name of *Lophopsittacus* for the group of which it is the type—the only known external character that we can as yet depend upon being that afforded by the singular frontal crest.

"In conclusion, I have to add that Strickland states (p. 13) that in the published accounts of Harmanszoon's voyage no mention of Dodos occurs. It is, however, evident that there was some one of his company well employed in taking notes; and it is only to be hoped that Prof. Schlegel will not much longer delay to print them."

The following papers were read:—

\* Ibis, 1866, p. 168.

† 'The Dodo and its Kindred,' pl. ii.



1. On the Colouring-matters of the Shells of Birds' Eggs.  
By H. C. SORBY, F.R.S., F.L.S., F.Z.S., &c., Pres.  
R.M.S.

[Received April 30, 1875.]

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INTRODUCTION.

Any one examining a large series of different kinds of birds' eggs could not fail to be struck with the almost unlimited variety of their tints, and might readily be led to suppose that nothing definite could be made out from them. I have, however, found, by employing the same kind of spectrum method of inquiry which has led to such definite results in the case of plants, as shown in my various published papers, especially in one on comparative vegetal chromatology\*, that all this apparent confusion is due simply to a variation in the relative and total amount of a limited number of definite and well-marked substances. So far as I have been able to ascertain, they have never been investigated by the spectrum method, and little more has been done than to offer such crude suggestions as that the redder colours are due to altered blood, which passes through the swollen vessels of the oviduct †, and that both the redder and greener colours are due to bile-pigments ‡ and are perhaps derived from the fæces in the cloaca §.

As I shall show, there is indeed good physical evidence to prove that the characteristic colouring-matters of eggs are closely connected either with hæmoglobin or bile-pigments, but not in such a manner as would agree with the above-named rough, almost mechanical theories, which were formed before the application of the spectrum method of inquiry made it possible to identify or distinguish organic colouring-matters of the kind now under consideration. So far as I am able to judge from what is now known, the colouring of eggs is due to definite physiological products, and not to accidental contamination with substances whose function is altogether different.

\* Proceedings of the Royal Society, 1873, vol. xxi. p. 442.

† Leuckart, 'Handwörterbuch d. Physiologie,' vol. iv. 894.

‡ Naumannia, 1858, p. 393.

§ Blasius, Zeitsch. für wiss. Zoologie, xvii. p. 480.

Hitherto I have been able to distinguish seven well-marked substances. One of these is identical with a colouring-matter met with in nearly all groups of plants, from the lowest to the highest; but I have not yet been able to identify any of the rest with any found elsewhere. But, at the same time, I must admit that our knowledge of animal colouring-matters is far too limited to make such negative evidence of much value. All these seven coloured substances found in the shells of birds' eggs are insoluble in water, but soluble in absolute alcohol, either when neutral or when a small amount of free acid is present. They are also sometimes soluble in chloroform or carbon bisulphide. Absolute alcohol, however, is in every respect the most convenient and best solvent. Some are extremely permanent, and resist the action of powerful reagents, whereas others are of such unstable character that they are not only rapidly changed by acids or oxidizing reagents, but are even partially decomposed by evaporating their solutions to dryness at a gentle heat. In these general peculiarities they resemble bile-pigments more than any other group of colouring-matters, but do not actually agree with any that have passed under my notice. Some of them furnish us with a number of most interesting facts in illustration of the probable existence of a connexion between optical properties and chemical or molecular constitution; and the spectra of some of them throw much light on the theory of the arithmetical relations between the wave-lengths of the centres of absorption-bands, as I have shown in a paper read before the Royal Microscopical Society\*; but on the present occasion I forbear to enter into such questions, and will confine myself as much as possible to the zoological aspect of the subject. At the same time it is absolutely necessary to enter into a certain amount of chemical and optical details, since otherwise the characteristic peculiarities of the different substances could not be established.

#### METHOD OF STUDY.

In the first place, it may be well to remark that very little indeed can be deduced with certainty from mere general colour. Some important and reliable information may be learned from the spectrum of the light reflected from the eggs themselves or transmitted through broken fragments; but in order to study colouring-matters in a satisfactory manner, it is requisite to obtain them in solution, so that they may be more or less separated from one another, their spectra seen to greater advantage, and the effect of various reagents determined. In the shells of eggs the coloured substances are so intimately associated with carbonate of lime that they cannot be dissolved out; and even when this has been removed, they are often so firmly enclosed in other insoluble organic substances, that it is difficult or impossible to dissolve them out completely. In the majority of cases it is best to remove the earthy carbonates by means of somewhat dilute hydrochloric acid, added gradually until no further effervescence takes place. The character of the residue varies much in different cases. Sometimes we obtain a

\* Monthly Microscopical Journal, vol. xiii. p. 198.

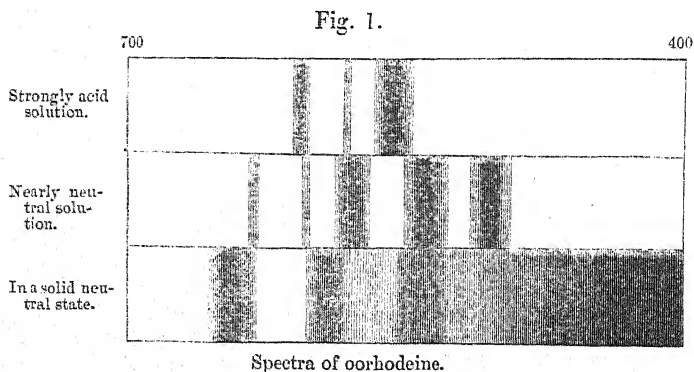
coloured membrane, occasionally like dark morocco leather, whilst in other cases the membranous part is very pale, and the colour chiefly occurs in detached skin-like flocks, or as minute particles disseminated through the liquid. By far the greater portion of these can easily be removed by filtration; but still in very many cases an appreciable quantity of the colouring-matter remains in the liquid, in such a state of unstable solution that nearly the whole is deposited in an insoluble form on evaporating at a gentle heat. In any case the insoluble coloured residue should be washed with water on a filter, abstracting from it any considerable portions of pale or colourless membrane; and after removing the greater part of the adhering water and the portions of the filter to which no colouring-matter is attached, it should be placed whilst still moist in absolute alcohol. This usually dissolves out a considerable amount of the colour; but some still remains insoluble. A portion of this is occasionally soluble in alcohol containing free acetic acid; but very often much remains undissolved until the residue is treated with alcohol containing hydrochloric acid. Sometimes even this fails to remove all, even when heated for many hours. All these different solutions should be kept separate, since they usually differ most materially; and in no case should a strong acid solvent be used unless found to be necessary, because several of the normal colouring-matters are rapidly decomposed by strong free acids. For this reason it is in some cases advisable to separate the carbonate of lime from the shell by means of acetic acid; but then unfortunately the colouring-matters are much less readily dissolved out of the residue by alcohol.

#### DESCRIPTION OF THE COLOURING-MATTERS.

These general remarks will I trust suffice to indicate the character of the methods usually employed; and I therefore now proceed to describe the different coloured substances hitherto met with. The number of species of eggs which I have been able to carefully study is less than I could have wished; but at the same time, in looking over large collections, I have been able to see that those which I have studied in detail represent nearly the whole of the characteristic differences. What more especially remains to be done is to find examples of eggs which will enable us to prepare in a more pure state certain colouring-matters which usually occur in small quantity so mixed with others that some of their characters cannot be determined, to examine a few special eggs to ascertain whether they contain any substance not yet recognized, to compare a more extensive series of eggs in order to learn whether particular coloured substances are or are not characteristic of particular groups of birds, and to establish more completely the connexion between the individual colouring-matters of eggs and those found elsewhere. Such an inquiry would necessarily occupy much time; and our knowledge of some important questions connected with the subject is very imperfect. However, what I have already been able to learn will, I trust, be sufficient to show how the methods I have employed will

suffice to explain the more obvious peculiarities of the colours of eggs.

1. *Oorhodeine*.—This is perhaps the most important and interesting of all the colouring-matters, not only because it gives a number of most interesting spectra, of such a well-marked character that a very minute quantity can be recognized without any difficulty, even when mixed with a relatively large quantity of coloured impurities, but because it occurs, in large or smaller amount, in the shells of such a great number of eggs that its entire absence is exceptional. When in a perfectly neutral condition it is almost insoluble in alcohol; so that when the washed shell-residue is digested in cold absolute alcohol very little is dissolved, until a small quantity of hydrochloric acid is added. On evaporating this solution to dryness at a gentle heat, and treating it at once with absolute alcohol, a considerable part dissolves, probably because a small quantity of acid clings to it; but if a small excess of ammonia be added, and the solution again evaporated to dryness, the neutral residue is all but insoluble in alcohol. These peculiarities enable us to separate oorhodeine from most of the other colouring-matters, and to obtain it approximately pure. It gives spectra with extremely well-marked absorption-bands, which differ in number, character, and position according to the conditions in which it occurs. The more important of these spectra are shown by fig. 1, in which, as well as in all the other figs., they are given, not as seen with a prism, but as they would appear in an *interference* spectroscope, since in that case alone do we see the true relations of the different parts. To any one accustomed only to an ordinary spectroscope the blue end will therefore appear abnormally contracted and the red end expanded unusually. The numbers given at the top represent millionths of a millimetre of wave-lengths of the light.



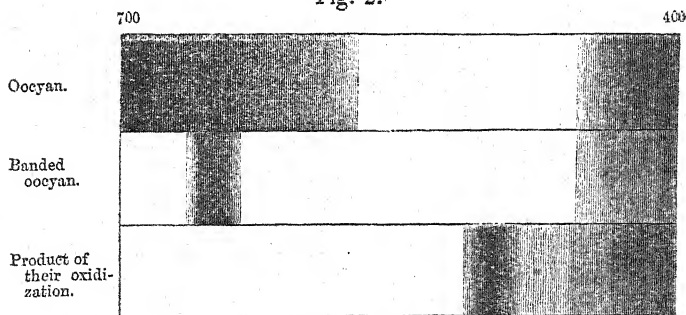
As will be seen, the strongly acid solution gives a spectrum with three bands, two of which are so well marked that a most minute quantity of the substance serves to show them in a satisfactory manner. When as small a quantity of free acid is present as will

enable the alcohol to dissolve oorhodeine, the spectrum shows the five absorption-bands given in fig. 1, and the general colour is brownish-red. This is the spectrum of the almost neutral modification when in a state of *solution*. When in a free *solid* form, as in the shell, or as found in the washed dry skin-like residue after removing the carbonate of lime by an acid, the spectrum is most materially different, as will be seen from the woodcut. Only three bands are distinctly visible, and they lie nearer to the red end, whilst there is far more of general absorption at the blue end. The result of this is that the general colour is a peculiar brown-red.

Oorhodeine is of such a very permanent character that it resists the action of very powerful reagents. I have been able to destroy it, but have not yet succeeded in changing it into any other coloured substance.

2. *Oocyan*.—In most cases this is readily soluble in neutral alcohol, and can thus be separated from oorhodeine. It is, however, often associated with yellow substances that cannot easily be removed; very commonly, therefore, the solution is of a somewhat green-blue colour, but in many cases the yellow impurity is far more easily decomposed by the action of light or by weak oxidizing reagents, and can be removed by this means, so as to enable us to determine the true colour and spectrum of the oocyan itself. When dissolved in alcohol, it is of a very fine blue colour. The spectrum shows no detached bands, but a strong general absorption of the entire red end and of a small portion of the extreme blue, as shown in fig. 2.

Fig. 2.



Spectra of the oocyan, &amp;c.

3. *Banded Oocyan*.—This also is of fine blue colour, but differs from the former species in giving a spectrum with a well-marked detached absorption-band near the red end, as shown in fig. 2. It is also far less soluble in neutral alcohol, so that it is left in the shell-residue after having been digested for some time in cold neutral alcohol, and can subsequently be dissolved out by alcohol, to which a minute quantity of hydrochloric acid has been added. The solution must, however, be examined at once, since banded oocyan is rapidly decomposed by strong acids.

Both these different kinds of blue colouring-matter are evidently in a state of very unstable equilibrium. Sometimes the greater part of the colour is lost by merely evaporating their solutions to dryness at a gentle heat; and several very interesting products can easily be obtained by acting on them with reagents.

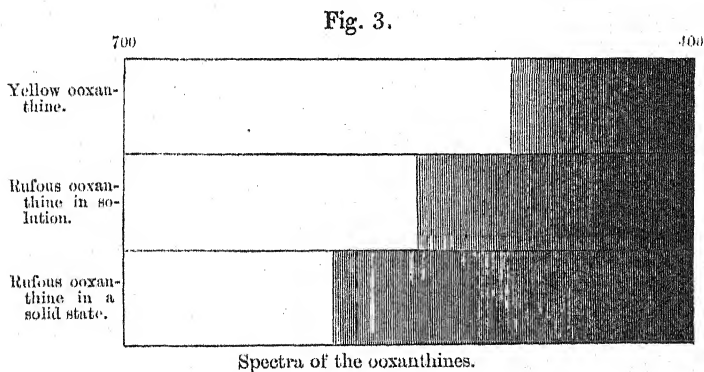
On adding a moderate excess of hydrochloric acid to a solution of oocyan, no other immediate change occurs than the destruction of some of the yellow substances that may be present; but in the case of *banded* oocyan, two new faint bands are developed in the orange and yellow end of the green, and it is gradually changed into a new modification, or perhaps even into a new substance, characterized by giving a spectrum with two bands, quite unlike that of the original. On adding to the solution of banded oocyan a little hydrochloric acid and nitrite of potash, it is rapidly decomposed into an orange-coloured substance, giving a spectrum with a simple well-marked absorption-band between the green and blue, as shown in the fig. In the case of oocyan this same substance is also produced; but there is an intermediate red compound formed, characterized by giving a spectrum with two bands (one in the orange, and the other at the yellow end of the green), which, however, do not correspond to those of the product of the action of acid on the banded oocyan.

It will thus be seen that these two blue colouring-matters (oocyan and banded oocyan) differ in very important particulars, but are obviously closely related, since they both yield the same well-marked product when oxidized.

4. *Yellow Ooxanthine*.—This substance may be best obtained from moderately fresh Emu-eggs. These are of a fine malachite green colour, due to a mixture of yellow ooxanthine with oocyan. On completely dissolving out the carbonate of lime with moderately strong hydrochloric acid, the residue is of deep green-blue colour, and a large part of the ooxanthine is decomposed by the action of the acid. On the contrary, if the carbonate of lime be dissolved out by acetic acid, nearly all the oocyan is lost, and a yellow residue is obtained, coloured by yellow ooxanthine, which, however, is so firmly associated with the thick tough membrane, that it is almost impossible to dissolve it out in alcohol. If, however, the shell be partially dissolved in dilute hydrochloric acid, a yellow layer is formed on the surface, which may be detached from the greener part below, not yet free from the earthy matter; and this yellow layer easily gives up part of its colour to neutral alcohol, and a further quantity to alcohol containing a little acetic acid. These solutions are of a clear yellow colour, giving a spectrum with no detached bands, absorbing the whole of the blue light, and strongly transmitting nearly all the green and the whole of the red end of the spectrum; that is to say, light of less wave-length than 500 millionths of a millimeter is absorbed, and of greater wave-length transmitted. In a solid state, in the egg-shell, the absorption extends down to wave-length 508. Alkali and weak acids produce no immediate change in the solution; but a strong acid like hydrochloric rapidly decomposes yellow ooxanthine, and leaves only a pale, almost colour-

less residue of another substance, which will be described in the sequel. This change takes place immediately if a minute portion of nitrite of potash be added to the acid solution. The alcoholic neutral or acetic solution is also rapidly decolorized by exposure to direct sunlight. Hence it will be seen that this yellow substance is in a state of very unstable equilibrium, and is rapidly decomposed by oxidization, when a strong acid is present in a free state, or when exposed to bright light.

5. *Rufous Ooxanthine*.—Hitherto I have not met with this substance in any other eggs but those of the different species of *Tinamou*, and have studied it more especially in those of *Rhynchotis rufescens*, in which it occurs associated with much oocyan. It agrees with yellow ooxanthine in being rapidly decomposed by a strong free acid, and immediately when a little nitrite of potash is added; but it is not so easily, if indeed at all, destroyed by the action of a moderately dilute aqueous solution of hydrochloric acid; and its presence does not seem to have any effect in decomposing the oocyan; whereas yellow ooxanthine has a most remarkable influence, since, as will be apparent from what I have already said, when the carbonate of lime is dissolved out by a weak acid the whole of the oocyan disappears if the amount of yellow ooxanthine is considerable, whereas no such decomposition occurs when it is absent. Rufous ooxanthine also differs from yellow ooxanthine in absorbing light to a very considerably greater distance from the blue end. Even when dissolved in alcohol it absorbs not only all the blue, but also at least one half of the green; that is to say, all light of less wave-length than 550 millionths of a millimetre is absorbed, and all of greater wave-length transmitted, which, of course, is a very well-marked difference, as will be seen on comparing the spectra given in fig. 3.



When in a solid state in the egg the absorption extends considerably further towards the red end, down to wave-length 590 or thereabouts; so that the tint is decidedly red, and not the orange-colour of the solution or the bright yellow of yellow ooxanthine. When mixed with oocyan, it therefore gives rise to the peculiar lead-colour

of the eggs of the rufous Tinamou—and not to green, like that of the fresh eggs of the Emu.

6. *Substance giving narrow absorption-bands in the red.*—Unfortunately I have not yet succeeded in obtaining this in sufficient quantity, or sufficiently free from other substances, to be able to decide whether its true colour is blue, green, or brown; but the fact of its giving a spectrum with several narrow absorption-bands in the red would certainly indicate that, when mixed with other colouring-matters, it would cause them to have an abnormally browner tint. Small quantities of it occur in very many eggs; but I have not yet found it so abundant in any as to exercise a more important effect on the general colour than to make it somewhat more dull. Since the entire spectrum is not accurately known, I will merely give the position of the different very narrow absorption-bands in millionths of millimetres of wave-length. The most complete spectrum shows three bands. On adding excess of ammonia, that nearest the red end alone remains, whilst the addition of a small excess of a strong acid removes all but the central band—and when the excess is considerable, raises this band towards the blue end. These facts will be better shown by the following table:—

	Centre of bands.		
Most complete spectrum . . . . .	668	648	628
With excess of ammonia . . . . .	668		
With a little acid . . . . .	..	643	
With much acid . . . . .	..	641	

By means of these bands a very small quantity of this substance can easily be recognized. It is not readily decomposed—but, when acted upon with oxidizing reagents, may be changed into another colouring-matter, giving rise to a spectrum with one or two somewhat obscure bands.

7. *Lichnoxanthine.*—In my paper on comparative vegetal chromatology \*, I have described a substance which occurs in greater or less amount in almost all classes of plants, from the lowest to the highest, but is more especially abundant in, and characteristic of, lichens and fungi, and for this reason has been named by me *lichnoxanthine*. The spectrum shows strong general absorption of the blue end down to about wave-length 510 millionths of a millimetre, and a much weaker general absorption down to about 590 millionths. Acids and alkalis produce very little change; and it is very slowly altered by strong oxidizing reagents. I have been able to prepare it artificially by the decomposition of resins. Some such substance is undoubtedly present in small quantity in very many kinds of birds' eggs; and occasionally there is so much as to materially modify the general colour. It may occasionally have been, to some extent, derived from the decayed vegetable matter of the nest, or, in the case of eggs which have been kept long, may be partly due to the growth of minute fungi; but, at the same time, a very closely allied,

\* Proc. Roy. Soc. 1873, vol. xxi, p. 462.



if not identical, substance does really appear to be a normal constituent of the shell of eggs having a peculiar brick-red colour.

#### THE VARIOUS COLOURS OF EGGS THEMSELVES.

Such, then, is a general account of those peculiarities of the colouring matters that have come under my notice, which suffice to distinguish them from one another and from analogous substances met with elsewhere; and I now proceed to a more detailed consideration of the eggs themselves. As an illustration of the method of study, suppose that we have taken portions of the brownish-red eggs of the common Grouse, of the pure brown eggs of the Nightingale, and of the pure blue of the common Thrush, separated from the black spots, kept for examination by themselves. After having, in each case, dissolved out the carbonate of lime with dilute hydrochloric acid and having washed the residues with water, they should each be digested in cold neutral absolute alcohol. Scarcely any colour would be dissolved out in the case of the Grouse—but a fine blue in all the others, which, on further examination, would be found to be oocyan, with mere traces of other substances. After having dissolved out as much as possible, by means of fresh neutral alcohol, the residue should be digested in alcohol with a small quantity of hydrochloric acid. It would then be found that the Grouse-shell would give a rose-coloured solution, containing much of the acid modification of oorhodeine. The Nightingale would also give much oorhodeine, but the colour would be modified by the presence of oocyan; the blue portion of the Thrush-egg would give a small quantity of a fine blue substance, showing the spectrum of banded oocyan, with little or no trace of oorhodeine, whereas the dark spots would be found to give a very considerable quantity of oorhodeine. We thus clearly see that the redder egg is mainly coloured with oorhodeine; the blue egg with oocyan—the brown colour of the Nightingale being due to mixture of these two, and the black spots on the Thrush-egg to patches containing much oorhodeine. All the various intermediate shades of colour, passing from red through brown to blue, whether they occur in the eggs of different species or in the more or less variable eggs of the same kind of bird, or in patches on the same egg, can thus be explained without any difficulty.

In a similar manner the various shades of green, passing from the blue-green of such eggs as those of the common Hedge Sparrow to the fine malachite green of the fresh Emu, and to the very yellow-green seen on them in patches, are all due to a variable mixture of oocyan with yellow ooxanthine.

As is, no doubt, well known, many green eggs turn blue on long keeping. In this manner the beautiful malachite green of fresh Emu-eggs passes into dark blue. This is easily explained by the fact that yellow ooxanthine is much more easily destroyed by oxidation than oocyan. A portion of a green Emu egg exposed to strong light soon becomes much bluer, and so does a mixed solution of the two colouring-matters in alcohol, the yellow constituent being destroyed and the blue left.

A few eggs are of a brick-red colour. Those of Cetti's Warbler are as good an example as any I have seen; and on carefully comparing them with the browner red eggs of the common Grouse, I found that both contained a large amount of oorhodeine, but that the tint was made more dull in the case of the Grouse by the presence of a small quantity of the colouring-matter which gives the narrow bands in the red; whereas in the case of Cetti's Warbler this was almost or quite absent, and there was present a relatively very unusually large amount of the orange-coloured substance, which I have not been able to distinguish from lichenoxanthine. To the presence of this substance we may thus attribute the brick-red tints seen in a few eggs.

#### CONNEXION BETWEEN THE COLOURING-MATTERS OF THE EGGS AND THE STRUCTURE OF THE BIRDS.

My studies of colouring-matters by the spectrum method soon led me to perceive that the individual species of certain groups of coloured substances are so intimately connected with their life that plants may be arranged in a kind of natural order according to the presence, absence, or relative proportion of the various coloured constituents, which order on the whole agrees remarkably with that founded on structural characters, as shown in my paper on comparative vegetal chromatology.\* This naturally led me to consider whether any such connexion could be recognized in the case of birds' eggs. Much remains to be learned before any positive opinion can be expressed; but what is already known appears to be sufficient to prove that, if there be any definite connexion between the general organization of birds and the coloured substances found in their eggs, it is not of such a kind as is at all obvious to any one who, like myself, is not thoroughly acquainted with anatomical details. Six out of the seven different colouring-matters occur in variable amount in a very great variety of eggs, but there is no greater variation than is met with in the different individual eggs of the common Guillemot; so that the study of the colouring-matters cannot be looked upon as of any value in distinguishing species, or even much wider groups, except, perhaps, in one particular instance. Hitherto I have met with rufous ooxanthine only in the eggs of the Tinamous, and perhaps in those of some species of Cassowary; and though the question needs further examination, it is perhaps desirable to give a short account of what is already known.

The eggs of the black variety of the common Duck are coloured with a nearly black substance, which I have not yet obtained in a state of solution, and which may correspond to the so-called *pigmentum nigrum*; but whether it is a simple substance or a mixture remains to be determined, and therefore it would be premature to class it with the other more typical colouring-matters.

#### EGGS OF THE TINAMOUS.

As previously described, rufous ooxanthine when in solid form in

\* Proceedings of the Royal Society, xxi. p. 442.

the shell of such redder Tinamou-eggs as those of *Crypturus obsoletus* (Wickham), absorbs the blue, the green, and some of the yellow rays, but transmits the orange and red; so that the colour is a sort of orange-red, made duller and of more leaden tint in the eggs of other species by mixture with oocyan. The result is that we obtain tints which are not so decidedly different from those due to a mixture of oocyan with oorhodeine as to lead any one to conclude at once that they were not due to the same substances. However, when the eggs in their natural state are properly illuminated by light so condensed on them sideways from a lamp that as little as possible is reflected from the surface, the spectra are seen to differ entirely. When oorhodeine is present, one or more of its absorption-bands may be seen; but when the red colour is due to rufous ooxanthine, no trace of any such bands can be recognized. My knowledge of the chemical and optical characters of rufous ooxanthine when in a state of solution were derived from the study of the eggs of the rufous Tinamou (*Rhynchotis rufescens*); and hitherto I have been able to study only the spectra of the eggs of other species through the kindness of Mr. Osbert Salvin, on whose authority I give the various names. Taking all the facts of the case into consideration, it appears to me to be almost certain that the redder-coloured constituent in all the different species is rufous ooxanthine. At all events, none show any trace of the bands of oorhodeine, and all show the same absorption of light of less wave-length than about 590 millionths of a millimetre. All that remains to be done to make this point certain is to examine the *solutions* derived from other species than that I have named, in order to be sure that the chemical as well as the optical characters are identical. In the present state of the question the following conclusions must be looked upon as only extremely probable.

No species of Tinamou yet examined contains any recognizable amount of oorhodeine. The colour of many species is due to a variable mixture of rufous ooxanthine with oocyan, the former greatly preponderating in such red eggs as those of *Crypturus obsoletus*, *C. pileatus*, and *Nothoprocta curvirostris*. The red and blue constituents occur in more equal proportion in the peculiar lead-coloured eggs of *Rhynchotis rufescens*. *Calodromas elegans*, when in a comparatively fresh state, contains so much yellow ooxanthine that it is pale green-yellow; but by exposure to light this yellow constituent is decomposed, and the shell becomes a pale flesh-colour from the small residual amount of rufous ooxanthine. Fresh-laid eggs of *Tinamus solitarius* are of nearly the same deep green as those of the Emu; and the long-kept eggs of *Tinamus robustus* are of fine blue, as though in some species there were very little rufous ooxanthine, and the colouring, as in the case of the Emu, due to a mixture of oocyan and yellow ooxanthine. It will thus be seen that all the various peculiar tints can be explained by the presence of a variable quantity of rufous ooxanthine.

I have carefully examined the spectra of many other eggs which appeared at all likely to contain rufous ooxanthine, but have not yet

seen any facts which seem to indicate that it occurs in any other group of birds than the Tinamous, unless, indeed, it be in the case of the eggs of *Casuaris bennettii* and *C. australis*. If further examination should confirm these conclusions, it appears to me that the facts will be of much interest in connexion with comparative physiology, as showing that, to a limited extent, even in the case of birds' eggs, there is a connexion between the general organization of the animals and their coloured secretions, since, as will be seen, such a well-marked group of birds as the Tinamous appears to be equally well distinguished by the formation of a special colouring-matter in the egg.

#### CONNEXION BETWEEN THE COLOURING-MATTERS OF EGGS AND OTHER ORGANIC PRODUCTS.

It would obviously be very interesting to learn what connexion there is between the various colouring-matters described in this paper and substances met with elsewhere. Perhaps further inquiry may lead to the discovery of some of them in other situations; but, with the exception of lichenoxanthine, I have not yet detected or been at all events able to identify them with confidence except in the shells of birds' eggs. The spectra of oorhodeine are so well marked that there could be no difficulty in recognizing a comparatively small quantity; and yet no trace can be detected in feathers whose general colour is practically identical with that of birds' eggs coloured with oorhodeine.

In considering the relation between the coloured substances in birds' eggs and other natural or artificial products, we are at once brought face to face with a branch of inquiry which seems to promise most valuable results, but is now so much in its infancy that the conclusions can only be looked upon as very plausible. In a paper recently read before the Royal Microscopical Society\* I have shown that in some cases it is certain, and in others probable, that when a coloured constituent is common to a number of distinctly different compounds these may and do generally give spectra which are most intimately related in the *ratio* of the *wave-lengths* of the centres of their absorption-bands, but the *actual* wave-lengths differ in the different spectra. We may perhaps better understand the facts by supposing that when a substance combined with the coloured constituent is replaced by some other, the general *shape* and constitution of the ultimate molecules is so slightly changed that the general character of the spectrum is the same, but the *size* of the molecules so far altered that they are put into relation with waves of light of a different length. It appears to me therefore that, when we meet with two substances which give almost exactly the same spectra and are changed in the same manner by the addition of reagents—in fact differ from one another only in the *numerical values*, and not in the *relations* of the wave-lengths of the bands or in any other essential particular—we may look upon it as very

\* Monthly Microscopical Journal, vol. xiii. p. 198.

probable that there is some important chemical or physical relation between the two compounds.

#### RELATIONS OF OORHODEINE.

It would be difficult to find more striking examples of such a connexion than oorhodeine and the product of the decomposition of the red colouring-matter of blood by strong sulphuric acid, discovered and described by Thudicum\*. When in a nearly neutral state, dissolved in alcohol, it gives a spectrum of exactly the same character as that of oorhodeine in the same physical condition; and on adding a small quantity of a strong acid to both they are both changed in the same manner, and give new spectra which are also of exactly the same character. The spectra of their neutral modifications and also those of the very acid solutions have most remarkable and unusual peculiarities, quite unlike those of any other substances; and therefore one cannot, I think, attribute the resemblance to mere accident. The agreement is so close that a superficial observer might easily be led to conclude that they were absolutely identical, and that oorhodeine was merely Thudicum's cruentine; but when the spectra are compared together side by side with a suitable instrument, it may be seen that although the number, relative intensity, and relative position of the bands, both in a neutral and acid condition, are exactly the same, the *position* of the band is *not* the same. The difference between the spectra is exactly like what is so often seen on comparing together the spectra of the same substance dissolved in different liquids; but this explanation will not apply in this case, because I find that the position of the bands in cruentine does *not vary* with the nature of the solvent, and the difference between its spectra and those of oorhodeine occurs when they are both dissolved in the *same* solvent. In order to show the nature of the relation of the spectra, I subjoin the following tables, giving the position of the centres of the absorption-bands in millionths of a millimetre of wave-length.

Table 1.—*Dissolved in nearly neutral alcohol.*

Oorhodeine .....	630	602	578	539	504
Cruentine .....	623	596	572	534	500
	<hr/>	<hr/>	<hr/>	<hr/>	<hr/>
Difference .....	7	6	6	5	4

Table 2.—*Dissolved in Alcohol with strong Acid.*

Oorhodeine.....	604	580	557
Cruentine .....	598	574	552
	<hr/>	<hr/>	<hr/>
Difference ....	6	6	5

Though I feel much tempted to enter further into the purely physical part of the question, it will, I think, be better to confine myself to what bears more directly on zoological facts. Following

\* Tenth Report of the Medical Officer of the Privy Council, p. 227.

out the kind of arguments made use of in my late paper in the 'Monthly Microscopical Journal,' the conclusions to which we are led by the above-described facts are that oorhodeine is in some way or other closely related to cruentine, but not identical with it, as shown not only by the well-marked difference in the spectra, but also by the difference in their solubility and power of resisting the decomposing action of powerful reagents.

In the present state of our knowledge the most plausible explanation of all the facts is that perhaps oorhodeine and cruentine contain some common coloured radical of the same chemical or physical constitution, combined with some other substance which is itself colourless, and that this second constituent is not the same in oorhodeine as in cruentine, but differs sufficiently to modify the general properties and to slightly alter the size of the ultimate molecules and so as to cause them to be related to waves of light of a little different length. It must, however, be borne in mind that I advance these views merely as being the most probable explanation of the facts. Assuming them to be true, they lead to the conclusion that the oorhodeine of birds' eggs is derived from the red colouring-matter of the blood, not by any mere mechanical exudation, but by some unknown physiological process of secretion, which breaks up the highly complex molecule of hæmoglobin into one which can be formed artificially by heating it with strong sulphuric acid; but in the living organism it combines with a second substance differing from that with which it combines when the change is effected by the action of hot strong sulphuric acid. Whether this view of the subject be in all respects true or not, it at all events appears to me very plausible and well worthy of further examination, as pointing to the source of one of the most important colouring-matters of birds' eggs.

#### RELATIONS OF THE OOCYANS.

In their normal condition the fæces of man, and probably those of many other animals, contain a yellow colouring-matter, which by oxidization yields a substance closely related, if not identical, with a product of the oxidization of the bilirubin of bile described by Jaffé\* and by Heynsius and Campbell†. When extracted from fæces by alcohol without contact with the air, it gives a spectrum which cuts off the blue end without any definite band; but when exposed to the air or treated with some oxidizing reagent, the solution becomes orange-coloured, and the spectrum shows a well-marked, dark, moderately broad absorption-band between the blue and the green, having its centre at wave-length 495 millionths of a millimetre. The addition of an excess of ammonia immediately removes this band without producing any well-marked change in the colour. Now I find, on comparing this substance with the product of the oxidization of the two species of oocyan, which gives the spectrum shown by fig. 2, that there is a close agreement in general characters, but yet a well-marked difference. The band

\* Virchow's Archiv, vol. xlvii. p. 262. † Pflüger's Archiv, vol. iv. p. 520.

in the product from the oocyan is about  $\frac{5}{4}$  the breadth; and its centre is a little further from the blue end, being at wave-length 497; and caustic potash does not develop any band as in the other substances. On the whole, then, if we follow the same line of reasoning as that adopted in the case of oorhodeine, we are led to conclude that the product of the oxidization of the two kinds of oocyan is in some way connected with a product of the change and oxidization of the colouring-matter of bile; and thus we may perhaps be justified in concluding that there is some chemical relation between the oocyan and bile. Bilirubin can indeed easily be converted by oxidization into a blue substance; but this differs entirely from either of the oocyan, both in its spectrum and in the character of the products of its decomposition. The residual bile-product found in fæces is in all probability a representative of a much further stage of change than to the oocyan; and if it could give rise to them it would be by a process of integration, which is not at all likely. On the whole their connexion with bile is as if we had two parallel series of products depending on two distinct physiological processes—one in the liver giving bile, and the other in the oviduct giving rise to eggshell-pigments.

#### CONCLUSION.

In conclusion I would say that the chief points which I have, I think, established are that all the varied tints of birds' eggs are due to mixtures of a limited number of colouring-matters, having well-marked specific characters. Except in one particular case, there is apparently no intimate connexion between the organization of the birds and the colouring-matters secreted; but, if further inquiry should prove that on the whole these substances are formed naturally only during the development of the eggs of birds, it would, I think, be an important fact in relation to comparative physiology and chromatology, as showing that special coloured substances are secreted under special anatomical and physiological conditions, as does indeed occur in the case of many other normal and abnormal secretions.

## 2. On the Hyoid Bone of the Elephant. By A. H. GARROD, B.A., F.Z.S., Prosector to the Society.

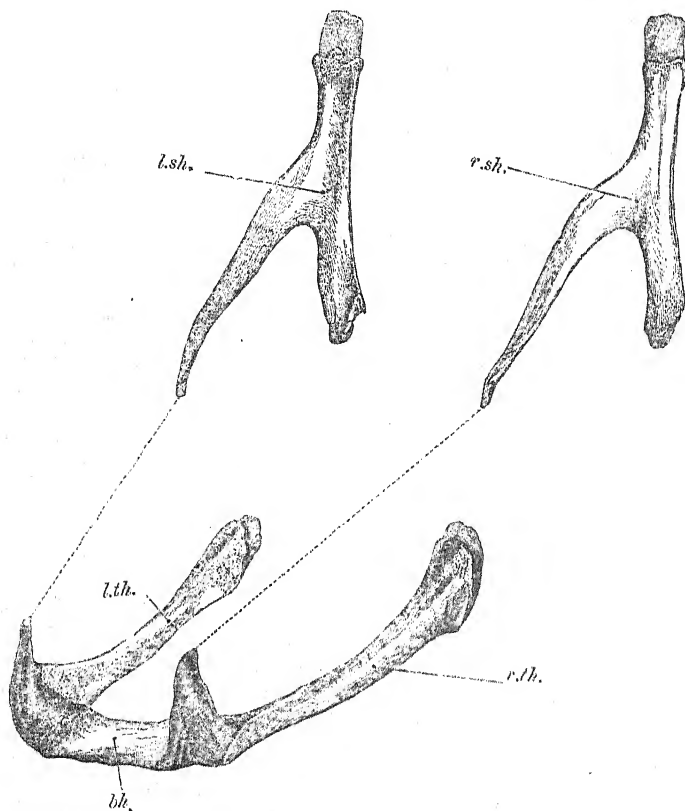
[Received April 1, 1875.]

The hyoid apparatus of the Indian Elephant (*Elephas indicus*) presents peculiarities which a study of the same in the Ungulata would tend to complicate rather than to simplify. The basihyal together with the thyrohyals form an arch (of which, by the way, I have not seen the components anchylosed even in adult specimens)—which does not present the least difficulty, a small pair of cartilaginous lesser cornua being present in the position of the lesser cornua of anthropotomy. It is the stylohyals which, as far as I can find, have not yet been correctly described. Of them Prof. Owen remarks\*, "From the middle of the stylohyal a slender

\* Anatomy of Vertebrata, vol. ii. p. 441.

pointed process is sent off at an acute angle." And in Prof. Flower's 'Osteology' it is said that "the stylohyals are remarkable for having a long pointed process projecting downwards from near the middle of their posterior border." Prof. Morrison Watson\* enters fully into the description of the hyoid muscles, without mentioning, though evidently correctly understanding, the disposition of the bones with which they are associated.

From the above remarks it is evident that the thick short portion of each stylohyal is assumed to be the body of that bone, the pointed process being considered to be an accessory part of it. Such, however, is not the case—the slender pointed process in reality corresponding to the long body of the stylohyal in the



Hyoid bones of Indian Elephant.

Perisso- and Artiodactyla, whilst the short thick process is the posterior descending process. That such is the case I have been able to prove recently in two specimens.

\* Journal of Anatomy and Physiology, November 1874, p. 131.



In the Indian Elephant the stylohyal (*s h*) is a thin bone composed, in the adult male, of a flat portion, 4 inches long, less than  $\frac{1}{4}$  inch thick, and very nearly  $\frac{3}{4}$  inch broad, with parallel sides, obtusely truncated at both ends, which are capped with cartilage. In the standing animal the position of this portion of the bone is nearly vertical. Above, it is closely united to the stylo-temporal region of the skull, whilst the lower end gives origin to the digastric muscle. From the middle of the *anterior* border continues onwards the body of the bone, at an acute angle with the lower portion of the above-described element, downwards and forwards. This is elongately triangular in shape, 6 inches long,  $\frac{3}{8}$  inch broad at its middle, and tapering to a point in front, where it gives attachment to a hardly specialized stylohyoid ligament and serves for the origin of the stylo-glossus muscle. The interval between the tip of this stylohyal and the lesser cornu (cartilaginous) of the hyoid bone is 5 inches, or a little less than the length of the process itself. As it descends in its downward and forward course, this tapering stylohyal curves slightly on itself, turning a little outwards.

The accompanying figure (p. 366) will explain the condition.

The descending digastric process, as it may be termed, may be compared to the posteriorly directed process of the stylohyal in the Ungulata. It differs from it, however, in one essential particular, which is that in the latter it does not give origin to the digastric muscle, but only to the stylohyoid; whilst in the Elephant the digastric arises from its lower end only, and the stylohyoid from the angle formed at its junction with the body of the bone.

In the Elephant therefore the deficiency of the lateral intermediate elements of the hyoid apparatus permit of a much greater movement of the base of the tongue than in the Ungulata, whose nearly rigid stylohyals, epihyals, and ceratohyals can allow of little more than an antero-posterior movement of the base of the tongue, in part of the circle of which the hyo-cranial attachment is the centre.

### 3. Notes on two Pigeons, *Ianthænas leucolæma* and *Erythrænas pulcherrima*. By A. H. GARROD, B.A., F.Z.S., Professor to the Society.

[Received April 1, 1875.]

Since my communication to the Society "On some Points in the Anatomy of the *Columbæ*"\*, specimens of two species of this group have died in the Gardens, which deserve a passing note.

*Ianthænas leucolæma*.—The genus to which this bird belongs has been, by different authors, placed sometimes in the Columbine and at others in the Carpophagine section of the family—the number of the rectrices (12, and not 14) having made its position uncertain, as its general appearance tends to that of the Fruit-eaters.

\* P. Z. S. 1874, p. 249 *et seqq.*

From the paper above referred to, the definition of the Columbinæ, containing the genus *Columba*, may be thus stated:—

**COLUMBINÆ.** Columbidae possessing an ambiens muscle, intestinal cæca, an oil-gland, 12 rectrices, and no gall-bladder.

Whereas *Carpophaga* possesses the ambiens muscle, an oil-gland, a gall-bladder, and no intestinal cæca.

In *Ianthænas leucolæma* the ambiens muscle and the oil-gland are present, as are the intestinal cæca\*. The gall-bladder is absent. This bird must therefore, together with *Columba*, *Turtur*, *Macropygia*, and *Ectopistes*, be placed in the Columbine and not in the Carpophagine division. The intestines are 47 inches in length, of average diameter; and the gizzard is typical in structure, having simple plicated pads.

*Erythrænas pulcherrima*.—This species is truly Ptilonopine in all its characters. As in *Ptilonopus*, the ambiens muscle is wanting, as are the cæca to the intestine. The gall-bladder is present; and the oil-gland is very small. The gizzard presents the peculiarities of that genus, although the four pads are not so regularly constructed, minor plications existing. There are 14 rectrices; and the intestines (which are capacious, as in all fruit-eating birds) are 16 inches in length.

#### 4. On the Genus *Scotophilus*, with Description of a new Genus and Species allied thereto. By G. E. DOBSON, B.A., M.B., F.L.S.

[Received April 17, 1875.]

In 1820 the genus *Scotophilus* was founded by Dr. W. E. Leach† on a single immature specimen of a Bat which belongs probably to the species now generally known as *Nycticejus temminckii*, Horsf.‡ That specimen was also made by Dr. Leach the type of his *Scotophilus kuhlii*; and this name would take precedence of Horsfield's if it were possible to determine decisively the adult form from an examination of the immature animal.

The specimen in question (which is preserved in alcohol in the British Museum) still retains the deciduous milk-teeth, which, in the case of the upper incisors, are two in excess of those found in all adult individuals belonging to this genus. It would therefore be quite impossible also to distinguish the genus as defined by Leach from Keyserling and Blasius's subgenus *Vesperus*§.

The question therefore arises, whether this genus, so very imperfectly defined, and founded on a specimen of an animal so immature that the species to which it belongs cannot be determined, should not be rejected altogether.

\* These are extremely slender, and require special precautions to be taken for their demonstration.

† Trans. Linn. Soc. 1822, xiii. p. 71.

‡ Horsfield, 'Zoological Researches in Java,' 1825.

§ *Vesperus*, subgenus of *Vesperugo*, Keys. & Blas. (Wiegmann's Archiv, 1839, p. 312).

It has been suggested, however, by Dr. W. Peters, who has pointed out these facts\*, that the name *Scotophilus* should be retained for those Bats inhabiting the Eastern Hemisphere, hitherto known as *Nycticeji*, which differ in many important respects, requiring generic separation, from the genus represented in the New World by *Nycticejus crepuscularis*, Le Conte, which possesses, numerically, the same dentition.

I have adopted Prof. Peters's suggestion, because zoological literature is thereby spared the burden of a new generic name. It still remains, however, to supplement the very imperfect and misleading original definition of *Scotophilus* by one from which the characters of this genus may be known and its members readily recognized. This is especially necessary; for since a large number of species representing very different groups were included by Dr. J. E. Gray under the common generic title *Scotophilus*†, this name has been indifferently applied, by English and American zoologists especially, to almost every species of Bat belonging to the family *Vespertilionidæ* of which the dental formula was known or suspected to represent less than thirty-eight teeth.

#### SCOTOPHILUS.

Muzzle short, obtusely conical, smoothly rounded off, naked: nostrils close together, opening by simple lunate apertures in front or sublaterally, their inner margins projecting: ears longer than broad, generally considerably shorter than the head, with rounded tips, the outer margin terminating behind the angle of the mouth in a distinct convex lobe; tragus tapering, generally subacutely pointed and curved inwards.

Tail shorter than the head and body, contained, except the terminal rudimentary vertebra, within the interfemoral membrane: calcaneum weak; wings attached or close to the base of the toes. Fur generally short and nearly confined to the body; wing- and interfemoral membranes very thick and leathery.

Skull thick, with prominent crests: occipital and sagittal crests often forming at their junction behind a thick projecting process from which the skull slopes evenly downwards and forwards to the end of the nasal bones in front; occiput concave, with prominent occipital crest; facial bones much shortened in front of infraorbital foramina, which are large and well defined; the bony palate very narrow behind last upper molar, extending backwards as far as the middle of the zygomatic arches; basioccipital between cochleæ broad; cochleæ partially concealed by the tympanic bullæ; paroccipital and mastoid processes well developed, prominent.

*Dentition*.—Inc.  $\frac{1.1}{6}$ ; C.  $\frac{1.1}{1.1}$ ; Pm.  $\frac{1.1}{2.2}$ ; M.  $\frac{3.3}{3.3}$ .

An additional external incisor, on each side, above, in the young. Upper incisors long, unicuspidate, acute, close to the canines by their

\* Monatsb. Akad. Wissensch. Berl. 1866, p. 679.

† "Revision of the Genera of Bats," Mag. Zool. & Bot. ii. pp. 497, 498 (1838).

bases; upper premolar large, exceeding the molars in vertical extent, and quite close to the canine: last upper molar consisting of a transverse plate only; first lower premolar small, *crushed in between the canine and second premolar*, which exceeds the molars in vertical extent. All the molar teeth very strong, with acute cusps.

*Distribution*.—Africa, Asia, and Australia. In Africa probably not south of Port Natal: in Asia confined to the warmer parts, extending from Afghanistan to Southern China and the Philippines: in Australia probably extending throughout the whole country.

This genus, though difficult to define, and approaching *Vesperugo*, Keys. & Blas., in many points, especially through certain species of that genus, contains a very natural group of Bats of very wide distribution (as above described) throughout the tropical and subtropical regions of the Eastern Hemisphere. They are distinguished specially by possessing a single pair of upper incisors separated by a wide space and placed close to the canines; by the small transverse first lower premolar crushed in between the approximated canine and second premolar, yet standing in the tooth-row; and, generally, by their short, conical, naked muzzle, and rather short and narrow ears; by their heavy bodies and strong limbs with remarkably thick and nearly naked leathery membranes; and by their short fur, generally olive- or chestnut-brown above, and yellowish or reddish white beneath.

Owing to the wide distribution and variableness in size and colour of the species of this genus, many different names have been given to the same species\*; and this variableness and a close external resemblance between different species inhabiting distant countries has caused considerable difficulty in determining species from descriptions either very imperfect or based upon general characters only, such as the colour of the fur and measurements.

It is evident, therefore, that if some characters be found by which the species may be divided into subordinate groups or subgenera, the difficulty of determining the different species will be much lessened. Such characters I have found in the form of the internal basal lobe of the ear and in that of the tragus.

The species may therefore be arranged as follows:—

- A. Internal basal lobe of ear angular, inferior margin straight, forming with the ascending margin almost a right angle: tragus with a narrow prominent ridge passing across its front surface from the base of its inner margin ..... (*Scotophilus*.)
  - a. Upper incisors close to canines; premaxillary bones very narrow, leaving a wide space between them in front, nasal opening very large.
    - a. Cingulum of the upper incisors very narrow ..... *S. temminckii*, Horsf.
    - β. Cingulum of the upper incisors forming a broad horizontal shoulder behind, scarcely raised above the level of the gum .. ..... *S. borbonicus*, Geoff.

\* E. g. *Scotophilus temminckii*, Horsf., = *Vespertilio belangeri*, Is. Geoff., = *Vespertilio noctulinus*, Is. Geoff., = *Vespertilio castaneus*, Gray, = *Nycticejus luteus*, Blyth, = *Nycticejus flaveolus*, Blyth.

- B. Internal basal lobe of ear convex, evenly rounded :  
 front surface of tragus smooth ..... (*Scoteinus*)
- a'. Ears nearly as long as the head; internal basal lobe commencing in a long lobule projecting backwards ..... *S. emarginatus*, Dobson.
- b'. Ears much shorter than the head, internal basal lobe commencing in a short lobule.
- γ. Cingulum of the upper incisors with a small cusp posteriorly ..... *S. rueppellii*, Peters.
- δ. Cingulum of the upper incisors without a posterior cusp ..... *S. greyii*, Gray.
- b. Upper incisors separated from the canines by a short space; premaxillary bones more developed; nasal opening small ..... (*Scotomanes*.)
- e. Cingulum of the upper incisors with a distinct cusp posteriorly ..... *S. ornatus*, Blyth.

This is not intended to represent a complete synopsis of the species of *Scotophilus*, but to indicate how the genus may be divided into groups, and to serve as a guide to determining the species. *Sc. ornatus* does not come properly under either of the first two groups; I have therefore placed this species by itself.

This very remarkable species, which inhabits the warm valleys among the hills below Darjeeling, the Kasia Hills, and Kakhyan ranges, Yunan, is distinguished from all the other species of *Scotophilus* by the peculiar pied condition of the fur\*, in which and in other respects, as in the form of the ear and tragus and shape of the head and muzzle, it approaches the American genus *Atalapha*.

If the skull be compared with that of a full-grown specimen of *Sc. temminckii*, the following differences may be observed:—

In *Sc. temminckii* the superior angle of the occipital crest forms with the sagittal crest a prominent projection; in *Sc. ornatus* this projection is small, the sagittal crest is more developed in front, and the postorbital processes are larger. The frontal in *Sc. ornatus* is grooved in the centre; in *Sc. temminckii* it forms a plane surface. In *Sc. ornatus* the premaxillary bones are much more developed and the nasal opening is not half the size of that in *Sc. temminckii*; the incisors also are placed at the inner side of the premaxillaries and separated from the canines by a space. In *Sc. ornatus* the bony palate is much broader behind the last molars, and does not extend so far backwards.

In the upper jaw, the teeth (with the exception of the incisors, which are separated from the canines and have an acute short posterior cusp) are very similar in both species: in the lower jaw

\* The following is a description of the colour of the fur in *Sc. ornatus*:— In males, above light chestnut, on the crown of the head a small longitudinal patch of pure white; from the back of the head, for two thirds the length of the spine, a narrow interrupted band of white extends longitudinally; at the base of the ears posteriorly a patch of white; on either side of the body two white patches, one in front of the head of the humerus, the other behind it: on the under surface a band of white round the neck connects the spots behind each ear, this is succeeded by a band of chestnut-brown, followed by a band of white and succeeded by pale brown, which extends to the root of the tail. In females the fur is much darker throughout, and the white spots and bands of less size and occasionally altogether absent in certain places.

the first premolar is less crushed in between the canine and second premolar than in any other species of the genus; it is, however, similarly flattened from before backwards, and has two short cusps arising internally from the cingulum, which are not found in the other species.

*Sc. greyii* (included in synopsis above) has been named but not described. I therefore add a description of this species (the smallest of the genus known), taken from an examination of the types in the British Museum, and from a specimen of an adult male, preserved in alcohol, from Port Essington in North Australia, presented by the Earl of Derby to the National Collection.

#### SCOTOPHILUS GREYII.

*Scotophilus greyii*, Gray, List of the Specimens of Mammalia in the British Museum, 1843 (not described); Voy. 'Erebus' and 'Terror,' 1844, pl. 20 (not described).

Crown of the head slightly elevated above the face-line; muzzle flat above, rather broad, glandular prominences on the sides of the face moderately developed: ears short, triangular, shortly rounded off above; basal lobe of inner margin rounded, ascending portion slightly convex, emarginate opposite the base of the tragus, and terminating in a distinct rounded lobe. Tragus broad, obtuse, with a triangular lobule near the base; inner margin straight, outer straight below, sloping inwards above from a point opposite the middle of the inner margin.

Wings to the base of the toes; postcalcaneal lobe small, but distinct, rounded, placed on the calcaneum at a distance from the ankle equal to the breadth of the foot; last caudal vertebra free.

Above chestnut-brown throughout; beneath similar, the extreme points of the hairs ashy.

Upper incisors close to base of canines, inclined forwards and inwards; lower incisors not crowded, indistinctly lobed; lower canines without internal basal cusp; first lower premolar small and blunt, crushed in between the canine and second premolar and pushed slightly inwards; posterior upper molar equal to half antepenultimate molar.

Length: head and body 1"·7, tail 1"·3, ear 0"·5, forearm 1"·38, tibia 0"·5, foot and claws 0"·35.

The following description of a new genus and species has been taken from a specimen preserved in alcohol, which had been obtained in the Bellary Hills, Southern India, by the Hon. J. Dormer, and presented by him to the British Museum.

#### SCOTOZOUS, nov. gen.

General characters those of *Vesperugo*, Keys. & Blas., but with two incisors only in the upper jaw.

*Dentition*.—Inc.  $\frac{1.1}{6}$ ; C.  $\frac{1.1}{1.1}$ ; Pm.  $\frac{2.2}{2.2}$ ; M.  $\frac{3.3}{3.3}$ .

The upper incisors large, unicuspidate, like small canines; each incisor close to the canine by its base, but inclined forwards and

inwards towards its fellow of the opposite side; first upper premolar minute, in the inner angle between the canine and the second premolar; first lower premolar not crushed in between the canine and second premolar.

SCOTOZOUS DORMERI, n. sp.

Crown of the head scarcely raised above the face-line; glands between the nostrils and eyes well developed, but not causing a depression between them on the muzzle; nostrils opening sublaterally, the space between divided in the centre by a narrow vertical band passing downwards to the lip as in *Vesperugo pipistrellus*: ears shorter than the head, triangular, with rounded tips; upper third of outer margin of the ear faintly concave, then gradually convex, again slightly concave opposite the base of the tragus, and terminating in a rounded lobe below the eye, on a level with the angle of the mouth. Tragus with a small triangular lobe near the base of the outer margin, outer and inner margins parallel as far as the upper third of the outer margin, where the outer margin slopes suddenly upwards and inwards, meeting the inner margin at an angle.

Thumb armed with a strongly curved claw; postcalcausal lobe distinct, triangular; tip of tail projecting; wings from the base of the claws; foot rather large, first toe nearly equal to the others in length.

Fur above brown, the extreme tips ashy; beneath darker brown, the terminal third of the hairs white.

A single large and acutely pointed unicuspidate incisor on each side above, directed forwards and inwards; this tooth almost touches the canine by its base; but its summit is closer to its fellow of the opposite side, owing to its direction inwards; from the outer side of its cingulum a very small spur projects. Second upper premolar large, equal to three fourths the canine in vertical extent, and placed close to it; in the small triangular space inside, between it and the canine, a minute premolar may be seen with the aid of a lens, not visible from without. Posterior upper molar equal to half the antepenultimate molar. Lower incisors crowded; middle incisors slightly larger than the others, all distinctly trifid: lower canines without a cusp from inner margin of cingulum. First lower premolar shorter than the second premolar, but in transverse diameter rather greater, nearer by its summit to the second premolar than to the canine.

Length: head and body 1"·5, tail 1"·15, head 0"·6, ear 0"·45, tragus 0"·18, forearm 1"·25, thumb 0"·25, second finger 1"·85, fourth finger 1"·4, tibia 0"·4, foot and claws 0"·28.

5. On the Breeding of certain Grallatores and Natatores in the S.E. of Ceylon, with Notes on the Nestling-plumages of the same. By W. VINCENT LEGGE, R.A., F.Z.S.

[Received April 20, 1875.]

During the prevalence of the S.W. monsoon in the month of June last year I made a trip to the S.E. coast of Ceylon, a locality but little known as regards its ornithology, with the view of ascertaining whether our *Sterninæ*, which, for the most part, leave the western side of the island at that season, were to be found then on the opposite and sheltered coast, or whether they were absent from that part also, and had migrated northwards for the purpose of breeding. The reward of this determination, revealed immediately on my arrival at my headquarters, Hambantota, certainly exceeded my expectation. I looked forward to seeing immature examples of many Terns, such as *Gelochelidon anglicus*, *Sterna bengalensis*, *S. pelecanoides*, &c., wandering about the salt lakes; but I was not prepared to find hundreds of *Sternulæ* and *Charadriinæ*, still less *Himantopus*, breeding on the salt-pans when, as I had conceived and others with me, they were engaged in carrying out that responsible duty thousands of miles north! Nevertheless, in spite of my preconceptions, there they were unmistakably occupied in the business of laying eggs and hatching young in a temperature of 87° Fahr. (in the shade), as if there were no such thing in existence as a delightful Central-Asian climate to do all this in. And as therefore this is the first record of the breeding in Ceylon of these birds, I propose to give the result of my discoveries in the following notes.

1. *ÆGIALITES CANTIANUS*, Latham.

This Sand-Plover, together with *Æ. mongolicus* (for the most part in winter dress\* and not breeding), was the most abundant of the *Charadriinæ* met with during my explorations. But before remarking on its nesting, I will describe the habitat of this and other Waders in this part of Ceylon.

A chain of shallow lakes or salt-pans, from which the Government of Ceylon annually obtains quantities of salt, fringe the coast in this flat district for many miles to the north of Hambantota; they are situated at about  $\frac{1}{4}$  of a mile from the sea shore, being separated from the beach by a narrow belt of jungle through which there is no communication with the outer salt water. The salt-pans (or *lōways*† as they are termed in Ceylon) are of great extent, many of them being more than 10 miles in circumference; but in the hot weather they become partly dried up (at which time the annual salt-"collections" take place), leaving around them a wide belt of foreshore consisting of a mixture of mud and sand, covered in many parts by tracts of

\* These must undoubtedly be birds of the previous year, not yet arrived at sufficient maturity to breed.

† Pronounced *Layroy*.



shell-fragments. In places these gravelly shell-wastes are worked into little mounds and hollows by the feet of cattle driven along the shore of the Lēways to their feeding-grounds. In these spots I invariably found the *Æ. cantianus* nesting. On the top of a little mound 6 inches high there would be a small hollow worked out and bottomed with a number of little shell-fragments, just large enough to contain three eggs. This was the general number of eggs, and was never exceeded; in some I found two, and in others, where the clutch was incomplete, only one. The eggs I procured were not all of the same type, differing both as regards ground-colour and character of marking. As a rule the ground was olive-grey, covered in some instances nearly uniformly with small irregular blots of dark sepia over indistinct spots of bluish grey, with here and there streaks and pencillings of a deeper hue; in others, of the same ground, the markings were most numerous at the obtuse end and the egg covered with longer streaks and scratches. A larger type than this was stone-yellow, with the markings consisting almost entirely of streaked blotches and zigzag pencillings of rich sepia\*. The largest measured 1.24 inch by 0.91, and the smallest 1.2 by 0.86. My eggs were all taken between the 27th of June and 14th of July, and were in most instances far advanced in incubation, besides which a fair proportion of nestlings were observed, showing the early part of the former month to be the commencement of the breeding-season. All the old birds had already lost the black frontal band, which I had found perfect in birds shot the previous year in the same district as early as the 17th of March, thus reducing the breeding-dress to a duration of only four months.

The plumage of the nestling (which I found running along the sand with the parent birds) is fulvous above, with black lines and spottings on the crown and nape, and a velvety black streak down the centre of the back, on either side of this streak the back is marked with black spots; tail black; the nuchal markings sweep round below the ears in a circle; beneath the down is white; bill black; legs and feet sickly olive-green.

The various devices resorted to by the old birds to attract attention and draw away the intruder from the nests were most interesting to witness. They consisted in the bird flying off to the right hand in front and then circling away across me to the left and making a circuit in rear until it came round to where it rose; this movement it would perform uttering the ordinary note, "chit-ek," "chit-ek." On alighting it would run off, supplementing this sound with a short whistle; and if successful in inducing me to follow it, it would squat on the ground for a moment and continue off with a low harsh cry. Were, however, its powers of persuasion not sufficient to draw me away in pursuit of it, it would rise and make the same circuit as be-

\* I should have been disposed to take these for the eggs of *Æ. mongolicus*; but I never could detect any other species in proximity to the nest but *Æ. cantianus*, whose actions and deportment on the approach of man could not be mistaken. I will not, however, undertake to pronounce positively that they were not the eggs of the former bird.

fore, always alighting to my right hand about 30 yards from where I stood. These movements were performed while I was in actual search of the nest; when approaching the vicinity of a nest for the first time, however, my attention was always drawn to the bird running along with its wings trailing on the ground.

## 2. *SARCIOPHORUS MALABARICUS*, Bodd.

I include a notice of this Plover, as I found its eggs. It is resident in Ceylon, and in the district in question breeds on low sandy ground not far from the shores of the Lēways. A nest I found on the 1st July was a slight hollow scraped in the ground and containing no materials for a lining. The number of eggs was four, of a rich stone-yellow, blotched throughout with several shades of rich sepia over a number of light inky spots; the markings, which were most numerous at the obtuse end, were elongated in the direction of the axis. In shape they were pyriform, and measured 1.46 inch by 1.12.

The young would appear to be led away from the nest as soon as they are hatched, as, on resorting one morning to a nest which the previous evening had contained four eggs, I found but one left, while the young from the remaining three were nowhere to be found in the vicinity of the spot, all traces of broken shells having been likewise removed.

## 3. *HIMANTOPUS CANDIDUS*, Bonn.

This species was abundant, and is in the breeding-season one of the most noisy birds imaginable. Before its nest or young are approached within a third of a mile it rises into the air, and, balancing itself with regular beating of the wings, utters loud cries for the space of several minutes, sallying off to a little distance and repeating its alarm-note with the view of drawing you away. It remains in the air thus for half an hour at a time, until it becomes a nuisance with its noise, keeping well out of shot all the while. I found that it commenced to breed in May, nesting generally on a gravelly bank on the shores of the Lēway and near the water. The nest is merely a slight hollow, resembling those of other waders. The eggs, which are either two or three in number, are stout, pyriform in shape, and of an olivaceous stone-yellow ground-colour, blotched openly all over with large dark sepia blots, upon others of an inky grey hue. The markings are largest at the obtuse end. Axis 1.63 inch; diameter 1.26.

On the 28th I discovered three nestlings on the end of an embankment jutting out into one of the Lēways; one of them concealed itself between two stakes; and the other two took to the water, swimming with great ease and speed. The lake was not less than 200 yards in breadth at the spot; and I watched the little fugitives across it. One captured nestling was placed alive in a leathern bag which my servant was carrying; but the mouth not being properly closed, in a few minutes it escaped, and ran with incredible speed along the embankment, dodging my servant with great adroitness, and giving him as much as he could do to recapture it. It has the head mottled buff and black, descending down the nape to a point; upper

part of hind neck white; lower part, interscapular region, scapulars, and wing-coverts dark olivaceous green, tipped fulvous; back buff, with black velvety bars; tail barred black and buff; tips of quill-feathers white; forehead and all beneath white; legs and feet greenish olive, toes above plumbeous.

A full-plumaged nestling, shot on the 14th July, had attained a length of 13·22 inches; wing 8; tarsus 4·1; hind toe and claw 1·7; bill at front 2·2: iris salmon-colour, slightly mottled dark; bill blackish olive, dusky at base of upper mandible, and yellowish beneath; tibia and tarsi brownish yellow, dusky bluish grey at joints; feet and sides of tarsi brown; crown and nape brown, fading on the hind neck into light brown, and deepening into blackish brown on the interscapular region and scapulars, where the feathers are edged with buff; primaries as in adult; wing-coverts and tertiaries conspicuously margined with buff.

#### 4. STERNULA SINENSIS, Gmel.

Great numbers of this Tern, as identified for me by Mr. Howard Saunders, breed on the foreshores of the Lēways. As far as I am able to judge without examples from other parts of the world for comparison, I procured three races of *Sternula* on the breeding-grounds.

They may be classed as under:—

*a.* With one blackish primary, from 7·25 to 6·9 inches in length, the bill long and not exceeding 1·3; vent and shorter under tail-coverts light iron-grey; feet clear orange.

*b.* With two blackish primaries, from 7·2 to 6·8 inches in length; bill slightly shorter than *a*, not exceeding 1·2, and with the gonys deeper and the under tail-coverts pure white; feet smaller than *a*, those of the females dusky orange.

*c*\*. With black quills and shafts and finely attenuated bill, dusky orange with black tip, and legs and feet yellowish brown.

It seems reasonable to suppose that *b* is very closely allied to, but a different species from, *a*, which Mr. Saunders identifies as *S. sinensis*, although its distinctive characteristics are rather trivial. The note of *S. sinensis* was a peculiar *Palæornis*-like pipe, while that of the other variety was a harsh Tern-like cry. A further reason for the existence of two species would be the great variety in size and character of marking displayed in many of the eggs which I took. The nests were found on the perfectly level earthy-sand foreshore, and consisted of the smallest perceptible hollows, appearing as if they were stamped out by the bird's feet, and containing no foundation or bottom of any other substance than the bare earth. They were as a rule a long distance from the water, and were never closer to each other than 10 or 12 feet, and very seldom as near as this.

\* An example of this type, now in the possession of Mr. Howard Saunders, and the only one procured, corresponds mainly with a bird shot at Colombo in December 1869 and identified by Lord Walden as *S. minuta*, the latter differing in its black bill and brownish red feet. A reddish line seems to be a mark of the winter dress in some Terns, those of *Hydrochelidon leucopareia* being quite red in winter against reddish black in summer.

The number of eggs was either two or three, the latter being the prevailing figure; they were not arranged, as those of *Grallatores*, point to point, and, when in twos, were neatly placed side by side. The eggs I procured divide themselves into four distinct types:—

1. Ovals somewhat pointed at the smaller end, but not obtuse enough at the major end to be pyriform, of a pale olive-green ground-colour, uniformly blotched, the markings as a rule running diagonally across the surface, with one or two shades of umber and dark purple-brown over spottings of bluish grey.

Dimensions—axis ranging between 1.43 and 1.38 inch; diameter between .92 and .94 respectively, the shortest egg being the stoutest.

2. Pointed ovals, of a stone-grey or yellowish grey ground-colour, marked with the usual blotches of faded blue or bluish grey, and blotched throughout with sepia and reddish brown, for the most part in small markings, but in large spots at the major end in some. In one or two there are small dottings of dark sepia and a few dark streaks of the same.

Dimensions—axis ranging from 1.38 to 1.23 inch, diameter from .98 to .92.

3. Short stumpy ovals, of a yellowish grey ground, faintly blotched or clouded with faded bluish grey, and marked sparingly over this with dull umber-brown or rich sepia, confluent somewhat round the centre in some.

Dimensions—axis ranging between 1.36 and 1.18 inch, diameter between .99 and .97.

4. Pointed ovals, of a greenish grey, whitish, or stone-yellow ground, handsomely marked with bold blotches of rich sepia, mostly round the obtuse end, and over large spots of faded bluish grey.

The ground-colour varied in this type more than in the others.

Dimensions—axis ranging between 1.37 and 1.28 inch, diameter between 1.0 and .96.

On our interfering with the nests some of the birds showed great courage and alarm, swooping close to our heads with loud screams; and from this I am able to identify\* both varieties 1 and 2 as belonging to the larger bird with the one black primary.

We found nests in different localities and in a variety of situations. In some the ground was stony in places; and here we found the young nestlings, able to run, most cleverly “planted” between reddish stones, they themselves so closely assimilating in colour that we could scarcely recognize them.

The chick when first hatched has the bill fleshy with a dusky tip, and the legs and feet fleshy red; the prevailing hue of the upper surface is rufous white, with three dark stripes over the vertex, and with the back striped and mottled with black. At about a week old, the rufous white turns to a sort of isabelline grey; and this again becomes tawny yellowish in the nestling flying well. At this stage

\* With regard to variety 4, I will leave Mr. Howard Saunders to make his remarks thereupon; I am forwarding this paper to him in order that he may, if he wishes, append notes of his own.

the plumage is as follows. Bill dusky above, fleshy yellow along edge of upper mandible, as is also the lower mandible, except the tip, which is dusky; legs and feet dingy yellow; iris brown, as in the adult. A black spot immediately in front of eye; lores and forehead cinereous grey, becoming darker on the vertex; nape and behind eye blackish, edged, except on the latter part, with tawny fulvous; hind neck, scapulars, and tertials yellowish tawny, with broad blackish oval marks, inside which the centre of the feather is dusky; wing-coverts slate-grey, the median edged fulvous buff with an adjacent blackish border. Quills dark silver-grey, the first two darker on the inner webs (probably the young of *♂*); tail pale slate-grey, tipped broadly with tawny yellow, with an adjacent black cross ray; beneath white. At this stage the wing measured 4.5 inches, and the tail was short and rounded. This example was shot on the 1st July. By the 13th there were numbers of well-grown birds about, with a wing of 6.2 inches, the bill measuring at that time 0.9 inch at front; the tarsi and feet were then dusky yellow, with the joints and outer edge of webs brownish. The bill was brownish yellow above, with the gape and base of lower mandible dingy yellow. The grey of the lores and forehead and the black of the nape had deepened, the vertex was less edged with fulvous than the above-described nestling; the back and scapulars were much the same, except that the tawny hue was leaving the centres and edges, which were both becoming whitish. On the radius the feathers were darker, as were also the quills, especially the inner webs of the first (*in the example now before me*); the outer tail-feather was white; and the remainder had an arrow-headed subterminal spot, of larger size than in the young individual.

Besides the above-mentioned species, *Hydrochelidon leucopareia*, *Gelochelidon anglicus*, and *Sterna bengalensis* were very abundant, and all in *winter plumage*. The year before I had shot an example of *G. anglicus* with the black hood in the same district as early as the 18th of March. It is very abundant in this part of the island; and last month, among numbers of winter-plumaged birds, I now and then recognized one with the summer hood. *Sterna pelecyanoides* was also common in the Hambantota district; it breeds on certain rocks off our coasts, as I am informed by Mr. Nevill.

Trincomalie, Oct. 20, 1874.

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June 1, 1875.

Dr. Günther, F.R.S., V.P., in the Chair.

Mr. Sclater made some remarks on the most noticeable objects he had seen during a recent visit to the Zoological Gardens of Rotterdam, the Hague, Amsterdam, Antwerp, and Ghent.

At Rotterdam the specimen of *Cryptoprocta ferox*, observed on the occasion of his previous visit in 1873\*, was still alive and

\* See P. Z. S. 1873, p. 473.

in fine condition. Besides the adult *Casuarus westermanni*\*, a second, younger, example of the same Cassowary was in the collection.

In the gardens belonging to the Society "Natura Artis Magistra" at Amsterdam, the series of Pheasants and Cranes had attracted his special attention. Amongst the former were several fine pairs of *Euplocamus vieilloti*† and *E. nobilis* (of the latter of which species a pair had been obtained for the Society's collection) and a single example of *E. pyronotus* of Borneo.

Besides examples of both the common and Victoria Crowned Pigeons (*Goura coronata* and *G. victoria*), was a single specimen of what appeared to be a third form of this group, most nearly allied to *G. coronata*, but having a vinaceous red chest. Of this bird, Mr. Sclater hoped, through the kindness of Mr. Westerman, to be able to give further particulars upon a future occasion.

At Antwerp the Pheasants and Antelopes had specially attracted Mr. Sclater's attention, as had likewise three young Tiger-cubs, born in the Gardens on the 14th of October, 1873, and most successfully foster-mothered by a large bitch. Most interesting specimens were likewise a West-African *Bos brachyceros* (sive *pumilus*), and the light-coloured Eagle from the Dobrudscha, upon which the species *Aquila cullenii* had recently been established by Dr. Bree ('Birds of Europe,' 2nd edit. vol. i. p. 89).

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Mr. Sclater laid on the table the typical specimen of his *Centropsar mirus* (P. Z. S. 1874, p. 176, pl. xxvi.), and made the following remarks:—

"My suspicions having been awakened as to this specimen by information received from Mr. E. Bartlett and by the criticisms of Dr. Cabanis ('Journ. für Orn.' vol. xxii. 1874, p. 458), I have made a thorough reexamination of it.

"The result arrived at is that the supposed novelty is undoubtedly composed of parts of three other birds. The head, wings, and body are those of a female or immature *Icterus*, possibly *I. auduboni*, though I have no specimen quite agreeing with it. To this have been added the worn tail of an *Agelaius gubernator* or *A. phaniceus*, and the legs of an *Otocorys*.

"*Centropsar mirus* may therefore be removed from the ornithological category. Mr. E. Bartlett tells me that there were other fictitious specimens in the same collection."

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\* Called *Casuarus kaupi*, P. Z. S. 1872, p. 147, pl. ix.

† Mr. Elliot, in his recent monograph of the Pheasants (plate xxvi. of vol. ii.), has united *E. vieilloti* to *E. ignitus*, considering the latter (founded on *Phasianus ignitus* of Shaw, not of Latham, as usually quoted) to be the young of the former. This I believe to be an error, as I cannot but consider the specimens of *E. ignitus* in the Leyden and British Museums to be fully adult birds. Mr. Westerman also tells me he has had an example of *E. ignitus* (Shaw) alive, and that it is decidedly distinct. Unfortunately its *patria* is not yet positively known. See my diagnosis of these three species, P. Z. S. 1863, p. 118.

Mr. Edwin Ward, F.Z.S., exhibited a pair of *Hippopotamus* teeth, and made the following remarks:—

"The *Hippopotamus* teeth sent for exhibition this evening are thought to be probably the largest that have as yet been obtained. The dimensions and weight of these two lower canine teeth are as follows:—length of each tooth from end to end round outer curve 30 and 31 inches respectively; circumference of each 9 and  $9\frac{1}{4}$  inches respectively. Total weight of the pair 15 lbs.

"These specimens were obtained at St. Lucia Bay, S. Africa, in 1873, by the Hon. Charles Ellis, to whose kindness I am indebted for being enabled to show them to the Meeting."

The following papers were read:—

1. On the Genus *Chalinolobus*, with descriptions of new or little-known Species. By G. E. DOBSON, M.A., M.B., F.L.S., &c.

[Received April 23, 1875.]

The genus *Chalinolobus* was formed by Dr. Peters for the reception of *Vespertilio tuberculatus* from New Zealand, discovered by Forster about 1773, and described in his MSS., which were not published till 1844\*. This species was redescribed by Mr. R. F. Toms in 1857† as *Scotophilus tuberculatus*; but, although his description occupies three pages, it is doubtful whether it would be possible to recognize the species from it; for some of the most important characters, as the lobes of the lower lip and the large post-calcaneal lobes, have not been noticed, and the dentition has been incorrectly described.

While examining some stuffed specimens and skins in the British Museum collection from South Australia and Tasmania, which had been labelled "*Miniopterus australis*" and "*Scotophilus morio*, Gray," corresponding to the same names in the 'List of Mammalia in the British Museum, 1843,' I observed that their dentition corresponded in all respects with this species from New Zealand; and repeated examinations and careful measurements have shown that they differ in no respect from it.

This is especially interesting; for *Chalinolobus tuberculatus* has hitherto been reported from New Zealand only, and was believed to be peculiar to that island. The occurrence of this species in Tasmania and South Australia, however, is not very surprising; for New Zealand is not more distant from Tasmania than the Azores from the coast of Portugal, and *Vesperugo leisleri* of Europe is certainly also found in the Azores.

The discovery of *Chalinolobus tuberculatus* in these dried specimens led me to suspect that other species from Australia and Tasmania described from skins might belong to the same group also;

\* 'Descriptiones animalium in itinere ad maris australis terras per annos 1772-74,' &c., p. 62 (1844), ed. Lichtenstein.

† P. Z. S. 1857, pp. 135-138.

and the same peculiarities of dentition occurring in *Scotophilus gouldii*, Gray, and in *S. nigrogriseus*, Gould, the relationship of these species with *Chalinolobus* was determined. By softening the dried integuments and by taking careful measurements of the bones remaining in the skins, I was enabled to determine that certain unnamed specimens in the collection, preserved in alcohol, belonged to the same species respectively, and in them the characteristic lobes of the lower lip were found well developed.

*Scotophilus poensis*, Gray, from Fernando Po, was, in the same manner, found to belong to this group; also *S. variegatus*, Tomes, and a new species, which will be described, from the Cameroon Mountains.

The number of species of this genus is thus raised from one to six; and the genus may be defined as follows:—

#### Genus CHALINOLOBUS.

*Chalinolobus*, Peters, Monatsber. Akad. Wissensch. Berlin, 1866, p. 679, and 1867, p. 480 (note).

Muzzle broad, generally very short and obtuse; nostrils opening sublaterally, forming a prominent flattened central ridge on the upper surface of the muzzle, separated from the well-developed glandular prominences by a distinct groove on either side. Ears short and broad, rhomboidal or ovoid; the outer margin prolonged forwards towards the angle of the mouth; tragus expanded above and curved inwards. *Lower lip with a distinct fleshy lobule* placed near the angle of the mouth and projecting horizontally outwards. Wings to the base of the toes; tail generally nearly as long as the head and body.

*Dentition*.—Inc.  $\frac{2-2}{6}$ ; C.  $\frac{1-1}{1-1}$ ; Pm.  $\frac{2-2}{2-2}$  or  $\frac{1-1}{2-2}$ ; M.  $\frac{3-3}{3-3}$ .

Upper incisors unequal; the inner incisors on each side long and unicuspidate; outer incisors short, scarcely equalling in vertical extent the cingulum of the inner incisors: in species having two upper premolars the first is very small, placed in the inner angle between the canine and closely approximated second premolar, and visible only with the aid of a lens.

This genus closely resembles *Vesperugo* in general characters, but is readily distinguished by the lobe projecting from the lower lip on either side near the angle of the mouth, by the unicuspidate upper inner incisors, by the remarkable obtuseness of the muzzle and shortness of the head, by the prominent nostrils separated by distinct grooves from the well-defined glandular elevations, and in most species by the peculiarly thin membranes traversed by remarkably distinct reticulations and parallel lines.

The form of the ear-couch and tragus, the short broad muzzle, the long tail generally wholly contained within the wing-membrane, and the shortness of the first phalanx of the longest finger, in some species, connect it with *Miniopterus*.

*Distribution*.—Continents of the Old World south of the equator—



Australia, Tasmania, New Zealand, and Equatorial and Southern Africa.

This genus may be considered intermediate between *Vesperugo* and *Miniopterus*, though it is evidently more closely allied to the former, and may be similarly divided into subgenera. These subgenera, however, similarly artificially based upon the presence or absence of the minute first upper premolar, separate the species into two very natural groups distinguished by other more important characters and inhabiting respectively a great continent.

*Synopsis of Subgenera and Species.*

- I. Premolars  $\frac{2-2}{2-2}$ , first upper premolar minute; fur generally dark, black or dark brown; head and shoulders darker than the posterior parts of the body; integuments dark... *Chalinolobus*.  
*Hab.* Australia, Tasmania, and New Zealand.
  - a. Internal basal lobe of the ear not forming a distinct lobule at the base projecting backwards..... *C. tuberculatus*.
  - b. Internal basal lobe forming a distinct lobule at the base projecting backwards.
    - a'. Outer margin of the ear terminating in front in a pendent lobule; forearm 1"·8 in adults..... *C. gouldii*.
    - b'. Outer margin of the ear terminating in a horizontal lobule; forearm 1"·35 in adults..... *C. nigrogriseus*.
- II. Premolars  $\frac{1-1}{2-2}$ , the single upper premolar large, close to the canine; fur generally light grey or cream-colour at the extremities; head and shoulders lighter than the posterior parts of the body; integuments white or light brown ... *Glauconycteris*.  
*Hab.* Southern and Equatorial Africa.
  - c. Internal basal lobe of the ear commencing in a long narrow lobule projecting backwards.
    - e'. A distinct postcalcaral lobule ..... *G. poensis*.
    - d'. No postcalcaral lobule; lower incisors not crowded... *G. argentatus*.
  - d. Internal basal lobe of the ear commencing in a short blunt lobule.
    - e'. No postcalcaral lobule; lower incisors crowded ..... *G. variegatus*.

In the species included under the first section (subgenus *Chalinolobus*) the tragus reaches its greatest width above the middle of the inner margin, as in *Vesperugo noctula*; and there is either no lobule near the base of the outer margin, or its position is occupied by a slight convexity. In the species included under the second section (subgenus *Glauconycteris*) there is a distinct, acutely pointed, triangular lobule near the base of the outer margin of the tragus, which reaches its greatest width about the middle of the inner margin.

CHALINOLOBUS GOULDI.

*Scotophilus gouldii*, Gray, Appendix to Grey's Journ. of two Expeditions of Discovery in Australia, p. 405.

Head short, crown of the head very slightly raised above the face-line: muzzle broad, obtuse; glandular prominences on the sides much developed, adding to the breadth of the muzzle in front; nostrils prominent above, separated on each side by a small sulcus from the

glandular prominences. Ears similar in general outline to those of *Miniopterus schreibersii*; inner margin of the ear very convex forwards in lower half, then sloping almost horizontally backwards to the tip, the position of which is determined only by a slight flattening of the upper third of the outer margin; the lower two thirds of the outer margin is slightly convex, and terminates in a conspicuous lappet of skin hanging vertically downwards, placed at a short distance behind the angle of the mouth. Tragus broad above, reaching its greatest breadth above the middle of the inner margin; the outer margin has a slight convexity near the base, above it a concavity from which the tragus expands considerably outwards, so that the superior part of the outer margin nearly equals the whole inner margin in length: the inner margin is straight or slightly concave. Lower lip with a distinct fleshy lobe, as in *C. tuberculatus*.

Feet small; wings to the base of the toes; postcalcausal lobe rounded, well developed, at a distance equal to the breadth of the foot from the end of the tibia; extreme tip of the tail projecting.

On the upper surface the fur extends upon the wing-membrane as far as a line drawn from the middle of the humerus to the knee, and the base of the interfemoral is occupied by a triangular patch of moderately long hairs. Beneath, the hair extends more densely somewhat beyond a line drawn from the elbow to the knee-joint, a few hairs passing outwards behind the elbow and posterior to the forearm and carpus, ranged along part of the oblique parallel lines traversing the wing-membrane from the forearm backwards, as in *Vesperugo noctula*. This band of hairs posterior to the forearm is found in almost every species of this genus.

On the upper surface the fur covering the head, neck, and shoulders is black, with a very faint reddish tinge; posterior to the point of origin of the antebrachial membrane the fur is dark at the base, the terminal half of the hairs yellowish brown, at the base of the tail and upon the interfemoral membrane yellowish brown throughout. Beneath, on the breast, the bases of the hairs dark, the terminal half reddish or ashy, on the abdomen the extremities of the hairs yellowish white, while on the sides of the body and on the wing- and interfemoral membranes the fur is pale yellowish white throughout.

Inner incisors unicuspidate and long; outer incisors very short, close to the outer and anterior sides of the bases of the inner incisors. Lower incisors trifid, crowded. First upper premolar exceedingly small, so minute as to be seen only with the aid of a lens, wedged in between the inner parts of the contiguous edges of the bases of the canine and second premolar, as in *V. noctula*; the second premolar is closely approximated externally to the canine, and the minute first premolar cannot be seen from without. The first lower premolar equals half the second in vertical extent.

Length (of an adult ♀ preserved in alcohol): head and body 2''·4; tail 2''·2; head 0''·75; ear 0''·6 × 0''·45, tragus 0''·28 ×

0"·15; forearm 1"·8; thumb 0"·3; second finger 3"·3; fourth finger 2"·15; tibia 0"·75; foot and claws 0"·35\*.

*Hab.* New South Wales; Tasmania.

**CHALINOLOBUS NIGROGRISEUS.**

*Scotophilus nigrogriseus*, Gould, Mamm. of Australia, vol. iii. pl. 44.

Head short, slightly elevated above the face-line; muzzle broad, shortly conical; nostrils prominent on the upper surface of the muzzle, projecting slightly by their inner margins in front, opening sublaterally, emarginate between, and closer together than in other species of this genus. Ears very rhomboidal in outline; the outer and upper angle, forming the tip, rounded off; the lower half of the outer margin slightly reflected backwards at the edge; emarginate opposite the base of the tragus, and terminating in a distinct rounded lobe close to the angle of the mouth, not hanging vertically downwards at its termination as in *C. gouldi*; tragus expanded outwards above, reaching its greatest width above the middle of the inner margin, the breadth of the summit equal to the length of the inner margin, which is straight or slightly concave. On the whole, the form of the tragus is very similar to that of *C. gouldi*.

Wings to the base of the toes; postcalcanear lobe rounded, well developed, about the breadth of the foot from the tibia; last rudimentary joint of tail free.

Above deep black, the tips with a slight brownish or greyish tinge; beneath similar, the tips ashy and generally of a lighter shade on the pubes and along the sides of the body.

Distribution of the fur and dentition quite similar to those in *C. gouldi*.

Length (of an adult ♂ preserved in alcohol): head and body 1"·75; tail 1"·35; head 0"·55; ear 0"·5, tragus 0"·2 × 0"·12; forearm 1"·35; thumb 0"·28; second finger 2"·6; fourth finger 1"·7; tibia 0"·55; foot and claws 0"·28.

*Hab.* Australia, northern and eastern coasts, Port Essington, Moreton Bay.

**CHALINOLOBUS ARGENTATUS, n. sp.**

The crown of the head is abruptly elevated above the face-line as in *Miniopterus*, but to a much less extent; muzzle short, very obtuse in front, broad and flattened above; nasal apertures wide apart in front, separated by a slightly concave space, opening sublaterally, bounded laterally by the front margins of the labial glandular prominences which are separated from the nostrils above by a sulcus on each side, as in the other species of this genus. Beneath, on each side of the chin, below the under lip, a smooth broad rounded elevation exists separated from its fellow of the opposite side by the

\* The original description of this species scarcely occupies two lines, and applies equally well to at least twenty different species; and the fact that all subsequent descriptions have been based on this and on the imagination of the describer, and were not derived from an examination of the types, will explain my reasons for giving so lengthened a description.

small naked space on the lip in front of the lower incisors. These elevated sides of the chin are covered with short hairs and enclose a hollow space between. Ears very like those in *Miniopterus*, short and rather sloped backwards; the inner margin commences in a long lobule directed backwards; the margin of the ear is almost regularly convex all round from the commencement of the inner margin to a point in the outer margin opposite the base of the tragus, where it becomes slightly emarginated, and immediately beyond abruptly convex, forming a short erect lobe connected by a low band with a wart in front at the angle of the mouth, which is continuous with a horizontal lappet of thickened skin extending forwards along the lower lip almost as far as a point opposite the lower canine. With this lappet of the lower lip the outer margin of the ear is thus directly continuous. Tragus semilunate, the inner margin slightly concave, the outer regularly convex, at the base a rather large equilateral triangular lobule very acutely pointed.

First phalanx of longest finger short, intermediate in length between that of *Miniopterus* and that of *Vesperugo*, terminal phalanx very long, flexed forwards on the under surface of the first phalanx in repose; in this position it extends nearly to the middle of the metacarpal bone. Feet small; wings to the base of the toes; calcaneum long and straight, extending quite three fourths the distance between the ankle and the tip of the tail; no postcalcaneal lobule.

Tail as long as the head and body, wholly contained within the interfemoral membrane.

The ears and the face are nearly naked, a few short hairs only appearing on the glandular prominences between the eyes and nostrils; the fur of the body above and beneath extends upon the wing-membranes as far as a line drawn from the middle of the humerus to the middle of the femur; the interfemoral membrane above and beneath is quite naked, except where a small triangular patch of hair appears at the root of the tail.

The fur is tricoloured, the basal third of the hairs black, the middle third white, and the terminal third a beautiful dark silvery grey. This is the arrangement of the colours about the middle of the body; but the grey is more prevalent towards and on the head, while the dark shades prevail slightly over the grey towards the tail.

The integument of the ears and face pearly white; wing- and interfemoral membranes dusky white, translucent, traversed by well-defined reticulations and parallel lines.

The teeth are very peculiar. The inner upper incisors very long, remarkably slender and acute; the outer incisor on each side fills up the space between the inner incisor and the canine by its broad base; but its unicuspidate vertically directed summit is very short, and scarcely exceeds the cingulum of the inner incisor. The canines are extremely long and slender, and are directed almost vertically downwards and slightly outwards; the lower canines are also very slender, but scarcely more than half the length of the upper ones. The upper premolar is very acute and close to the canine;

the posterior upper molar little more than half the size of the second molar. The lower incisors are distinctly trifid, some even appearing to have a fourth lobe; they are not crowded, and form a regular semicircle across the wide space between the canines. The lower premolars are also, like the canines, very slender and acutely pointed, the first premolar about half the size of the second.

Length (of an adult ♀ preserved in alcohol): head and body 2"·0; tail 2"·0; head 0"·55; ear 0"·5, tragus 0"·22 × 0"·1; forearm 1"·7; thumb 0"·25; first finger 1"·7; second finger—metacarp. 1"·7, 1st ph. 3"·6, 2nd ph. 1"·3; third finger—metacarp. 1"·55, 1st ph. 0"·45, 2nd ph. 0"·5; fourth finger—metacarp. 1"·35, 1st ph. 0"·4, 2nd ph. 0"·3; tibia 0"·72; foot and claws 0"·3.

*Hab.* Cameroon Mountains, western equatorial Africa.

This species has a general resemblance to *Miniopterus schreibersi* in the shape of the head and ears, in the shortness of the first phalanx and great length of the terminal phalanx of the longest finger, in the long and slender tail wholly contained within the interfemoral membrane; added to which the grey colour of the fur and corresponding size would cause specimens of this species to be readily confounded, on a superficial examination, with specimens of the European grey-coloured *M. schreibersi*.

#### CHALINOLOBUS POENSIS.

*Kerivoula poensis*, Gray, Ann. Mag. Nat. Hist. vol. x. p. 258 (1842).

Bars very similar to those of *C. argentatus*; inner and outer margins convex, without a distinct tip, the outer margin forming a convex lobe in front of the base of the tragus, and terminating close to the angle of the mouth, the internal basal lobe forming a narrow lobule projecting backwards. Tragus similarly semilunate, even more curved inwards; the outer margin to the lip forming an arc nearly equal to two thirds of the circumference of a circle; the inner margin slightly concave; immediately above the base of the outer margin a prominent, acutely pointed, triangular lobule. So far as can be perceived from an examination of the dilapidated specimen which forms the type of this species, the lower lip has a horizontal lobe extending from the angle of the mouth to a point opposite the lower canine tooth, as in *C. argentatus*. Nostrils wide apart, separated by a slightly concave space nearly one tenth of an inch wide, and opening almost directly laterally.

Thumbs and feet as in *C. argentatus*, and similarly black at the extremities, with black claws. Postcalcaneal lobe long and narrow, triangular, the apex of the triangle (which is placed about the middle of the lobe) supported by a small cartilaginous projection placed at right angles to the calcaneum. The tail appears to be wholly contained within the interfemoral membrane.

Fur above dark at the base of the hairs, the extremities grey on the head and neck, and grey with a yellowish tinge on the back and sides; beneath similarly dark at the base, with greyish yellow extremities.

The fur of the body extends upon the wing-membrane as far as a

line drawn from the middle of the humerus to the middle of the femur, and upon the interfemoral triangularly as far as the end of the third caudal vertebra. Beneath, the wing-membrane is covered as far as a line drawn from the elbow to the knee-joint, and a few thinly spread hairs are ranged in short parallel rows on the membrane posterior to the elbow and forearm.

Teeth similar to those of *C. argentatus*, but not so slender, and the upper incisors are more inclined inwards and have the small projection on their outward sides near their extremities.

Length (total) about 3 inches, of which the tail appears to measure half; ear 0".4, tragus 0".16  $\times$  0".08; forearm 1".5; thumb 0".23; second finger—metacarp. 1".5, 1st ph. 0".5, 2nd ph. 1".0; third finger—metacarp. 1".4, 1st. ph. 0".35, 2nd ph. 0".45; fourth finger—metacarp. 1".25, 1st ph. 0".3, 2nd ph. 0".3; tibia 0".63; foot and claws 0".28.

*Hab.* Fernando-Po Island, west coast of Africa.

This species resembles *C. argentatus*, but is at once distinguished by the presence of a postcalcaral lobe, and by its smaller size.

#### CHALINOLOBUS VARIEGATUS.

*Scotophilus variegatus*, Tomes, P. Z. S. 1861, p. 36\*.

Closely allied to *C. argentatus*, which it resembles in general form, in size, and in the colour of the fur. It is, however, readily distinguished by the shortness of the lobule at the base of the inner side of the ear-conch, and by the lower incisors, which are crowded between the canines and placed at right angles to the direction of the jaw. The teeth are similar to those of *C. poensis*, not slender and extremely acute as in *C. argentatus*; and this condition is present in immature specimens also, so that the comparative bluntness of the teeth is not due to age. The head is also longer, the ears larger, and the face is covered with hair to within a short distance from the end of the nose. The lobes of the lower lip are smaller, and the under surface of the lower jaw not raised on the sides as in *C. argentatus*.

The calcaneum is quite similar to that of *C. argentatus*; and there is no postcalcaral lobe. I have examined the type specimen of this species, and find that the postcalcaral lobe described by Tomes has been produced by distortion in drying.

Length (of a ♂ preserved in alcohol) 1".9; tail 1".8; head 0".65; ear 0".6, tragus 0".22; forearm 1".55; thumb 0".3; 2nd finger—metacarp. 1".4, 1st ph. 0".6, 2nd ph. 1".0; 4th finger—metacarp. 1".3, 1st ph. 0".3, 2nd ph. 0".3; tibia 0".7; foot and claws 0".3.

*Hab.* Otjoro, S.W. Africa.

\* The type of this species from Mr. Tomes's collection (and also a duplicate in alcohol) is preserved in the Berlin Museum, which I have lately visited; and Prof. Peters has most kindly afforded me every opportunity for examining the invaluable collection of Chiroptera, which has been brought together from all parts of the world by his unwearied exertions.

2. Descriptions of Two new Land-Shells from Madagascar and New Guinea. By HENRY ADAMS, F.L.S.

[Received April 27, 1875.]

(Plate XLV.)

*EURYCRATERA FARAFANGA*, sp. nov. (Plate XLV. figs. 1, 1a.)

*E. testa imperforata, depresso-ovata, solida, rugis obliquis irregularibus sculpta, pallide fulva, fasciis plurimis rufo-castaneis, nonnullisque latis ornata; spira brevi, subconoidea; anfr. 4, convexiusculis, rapide accrescentibus, ultimo inflato; apertura obliqua, ampla, ovali, intus margaritacea, fasciis perluculentibus; perist. albo, incrassato, breviter expanso, marginibus callo crasso junctis, columellari dilatato.*

Diam. maj. 60, min. 45, alt. 50 mill.

*Hab.* Madagascar; on a sandy plain in the south-west, near the Farafanga river.

*PUPINOPSIS ANGASI*, sp. nov. (Plate XLV. figs. 2, 2a.)

*P. testa perforata, pupæformi, solida, rugoso-malleata, non nitente, rubida vel pallide fulva; spira medio tumida, in conum depressum terminata; anfr. 7, superis convexis, penultimo latere apertura planato, ultimo angustiore, antice descendente, basi juxta perforationem cristato; apertura verticali, circulari, bicanaliculata; perist. incrassato, flavido vel albido, reflexo, margine dextro sursum producto, canali levi a parietali separato, margine columellari medio inciso, canalem apertum extus dilatatum callo circumvallatum formante.*

Long. 20, diam. 12 mill.

*Hab.* Louisiade archipelago, south-east of New Guinea.

This species is closely allied to *P. grandis*, Forbes, but differs from it in being very much smaller, in having a narrow umbilicus or perforation, and in the first four whorls of the spire being more depressed.

3. Descriptions of Three new Species of Shells from Australia. By GEORGE FRENCH ANGAS, Corr. Mem. Z.S., F.L.S., &c.

[Received April 27, 1875.]

(Plate XLV.)

1. *HELIX FORRESTIANA*, n. sp. (Plate XLV. figs. 3, 3a.)

Shell narrowly perforate, globosely trochiform, rather thin, obliquely striated, very finely transversely granulated; from the apex to the middle of the last whorl fulvous chestnut, with an indication of a band of a lighter colour between the periphery and the suture of the last whorl, below the periphery pale yellowish brown; spire obtusely conical; whorls 5, slightly convex, the last rather inflated,

descending in front, a little contracted behind the aperture; aperture very oblique, ovate, purplish brown within; peristome not thickened, widely expanded, the margins approximating, joined by a thin callus; the right margin slightly flexuous, brown; the columellar margin white, dilated and reflexed, nearly concealing the perforation.

Diam. maj. 10, min. 7, alt. 7 lines.

*Hab.* North-west Australia.

This shell differs from the other Australian *Helices* to which it is allied, in having the outer lip thin and very widely expanded. I have named it after Mr. John Forrest, whose recent explorations in Western and Central Australia have added to our knowledge of a hitherto unknown portion of that island continent.

## 2. *HELIX BROUGHAMI*, n. sp. (Plate XLV. figs. 4, 4a.)

Shell narrowly perforate, conically globose, rather thin, obliquely striated and obscurely minutely granulated, very pale brown above, white below, with three narrow reddish brown bands—one at the suture, one above, and one below the periphery of the last whorl; spire obtusely and depressedly conical; whorls  $5\frac{1}{2}$ , slightly convex, the last rounded, descending in front; aperture oblique, circularly lunate; peristome slightly expanded and reflexed, the margins approximating, the columellar margin almost straight, dilated above, and nearly covering the perforation.

Diam. maj. 12, min. 10, alt. 10 lines.

*Hab.* Port Lincoln, South Australia.

Allied to *H. cassandra*, Pfr., but differs in having the spire considerably more elevated, and in the columellar margin being straightened and dilated and reflexed, nearly concealing the perforation.

## 3. *EURYTA BRAZIERI*, n. sp. (Plate XLV. figs. 5, 5a.)

Shell somewhat narrowly fusiform, the spire a little longer than the aperture, white, shining, ornamented with three broad transverse sharply defined bands of irregular descending olive-brown lines here and there passing into blotches, the central band the broadest; apex olive-brown; whorls 7, slightly convex, longitudinally plicate, the last whorl more narrowly and finely plicate, with the interstices crossed by fine liræ, the plicæ ceasing above the central band, faintly transversely sulcate at the base; aperture narrow; columella slightly subflexuous and covered with a thin callus; outer lip simple, acute.

Long. 6, lat.  $1\frac{1}{2}$  lines.

*Hab.* Dredged off Port-Jackson Heads, in 25 fathoms.

A prettily marked shell, quite distinct from any of the other Australian species of this genus hitherto described.

## DESCRIPTION OF PLATE XLV.

Figs. 1, 1a. *Euryeratera farafanga*, p. 389.

2, 2a. *Pupinopsis angasi*, p. 389.

3, 3a. *Helix forrestiana*, p. 389.

4, 4a. *Helix broughami*, p. 390.

5, 5a. *Euryta brazieri*, p. 390.



4. Descriptions of several new Species of Indian Heterocerous Lepidoptera. By ARTHUR G. BUTLER, F.L.S., F.Z.S., &c.

[Received May 1, 1875.]

The following species have recently been added to the National Collection :—

Family SPHINGIDÆ.

Genus PANACRA.

PANACRA PERFECTA, n. sp.

Form of *P. vigil*, but pattern and coloration of *P. metallica*. Head, palpi, collar, pterygodes, and thorax above olive-brown; a lateral line on the vertex of the palpi, along each side of the head, collar, and pterygodes lilacine; a central spot on the crest, and another in the middle of the collar, of the same colour; a whitish line along the inner margins of the pterygodes; abdomen greyish brown in the centre, tinted with lilacine at the base, and with a dorsal double series of indistinct blackish spots, two on each segment; sides of the abdomen mahogany-brown, with a broad paler streak, ferruginous on the basal segments, but golden mottled with ferruginous on the posterior segments; primaries above olivaceous, varied on discoidal area with lilacine streaks, and longitudinal blackish and grey lines on the nervures; a black dot at end of cell surrounded by a lilacine zone; a piceous streak, followed by three blackish parallel oblique lines from internal margin to upper radial nervure; apical and external areas (including the central portion of the interstices between the oblique lines) buff, varied with olivaceous; an irregular discosubmarginal brown line from apex to external angle, margined by a brownish diffused streak at its extremities and between the radials (at which point the external area is dark olivaceous); an exterior submarginal line parallel to the last, but not reaching the apex; outer margin olivaceous; secondaries rosy brown, clothed at base with greyish olivaceous hairs, external area dark brown, a double submarginal ochreous streak from just beyond the third median branch to the anal angle; fringe yellow, spotted with black at the ends of the nervures: palpi below white, ferruginous at the sides; pectus bright golden, varied in front with ferruginous, and at the sides with silver scales; coxæ and trochanters sordid white, fringed with ferruginous, anterior femora and tibiæ brown, tarsi white; second pair of legs pale brown, the femora fringed above with orange, below with gold; third pair rosy whitish, the femora fringed below and the tibiæ above with golden scales; venter ferruginous, sprinkled all over with golden scales, a silvery lateral patch on the basal segments, a whitish central streak; a lateral row of black dots; primaries below with the basal half dark greyish brown, costa ochraceous; external half ochre-yellow, a broad red streak tapering from the end of the cell to the apex; the oblique lines of the upperside red, the submarginal lines blackish, with white interstitial line at

apex; secondaries grey, costa yellow, subcostal, abdominal, and disco-anal areas carmine-red: the disco-anal area mottled with yellow; three central brown lines diverging upon costa, and traversed by a waved transverse series of seven black dots upon the nervures; a golden spot in the cell; two submarginal brown lines, the inner one only extending along the margin of the discal carmine area; margin ferruginous, fringe as above; expanse of wings 2 inches 6 lines.

Darjeeling, June 1874 (*Sadler*).

Type, B.M.

#### Genus LEUCOPHLEBIA.

##### LEUCOPHLEBIA DAMASCENA, n. sp.

Allied to *L. bicolor*, altogether darker, with narrower silky ochreous streak on primaries.

♀. Head and thorax deep dull plum-colour, a dorsal ochreous thoracic streak; antennæ whitish brown; abdomen greyish rose-red, with central longitudinal buff streak; segments margined behind with deep ochreous, with a whitish fringe; primaries deep plum-colour, a broad streak of silky ochreous, tapering towards base and apex, and throwing out spine-like streaks along the median branches and radials; fringe near external angle pale stramineous; secondaries deep ochreous; outer margin rosy, fringe and costal area stramineous; wings and body below nearly as in *L. bicolor*; expanse of wings 2 inches 5 lines.

Sikkim (*Whitely*).

Type, B.M.

The most richly coloured, and consequently the most beautiful species in the genus.

The two preceding species having been obtained subsequent to the reading of my papers on the Sphingidæ, I have thought it best to send them to the 'Proceedings,' as they can thus be added with greater brevity to my revision of the family.

#### Family LITHOSIIDÆ.

##### Genus AGALOPE.

##### AGALOPE PRIMULARIS.

Allied to *A. basalis*, but the entire ground-colour of the primaries in the male lemon-yellow, and the basal orange spot brighter; primaries of the female without the basal orange spot; the primaries yellowish, with the base and a diffused streak below the median nervure lemon-yellow; expanse of wings, ♂ 1 inch 6 lines, ♀ 1 inch 8 lines.

♂, ♀. Darjeeling, May 1874 (*Sadler*).

Type, B.M.

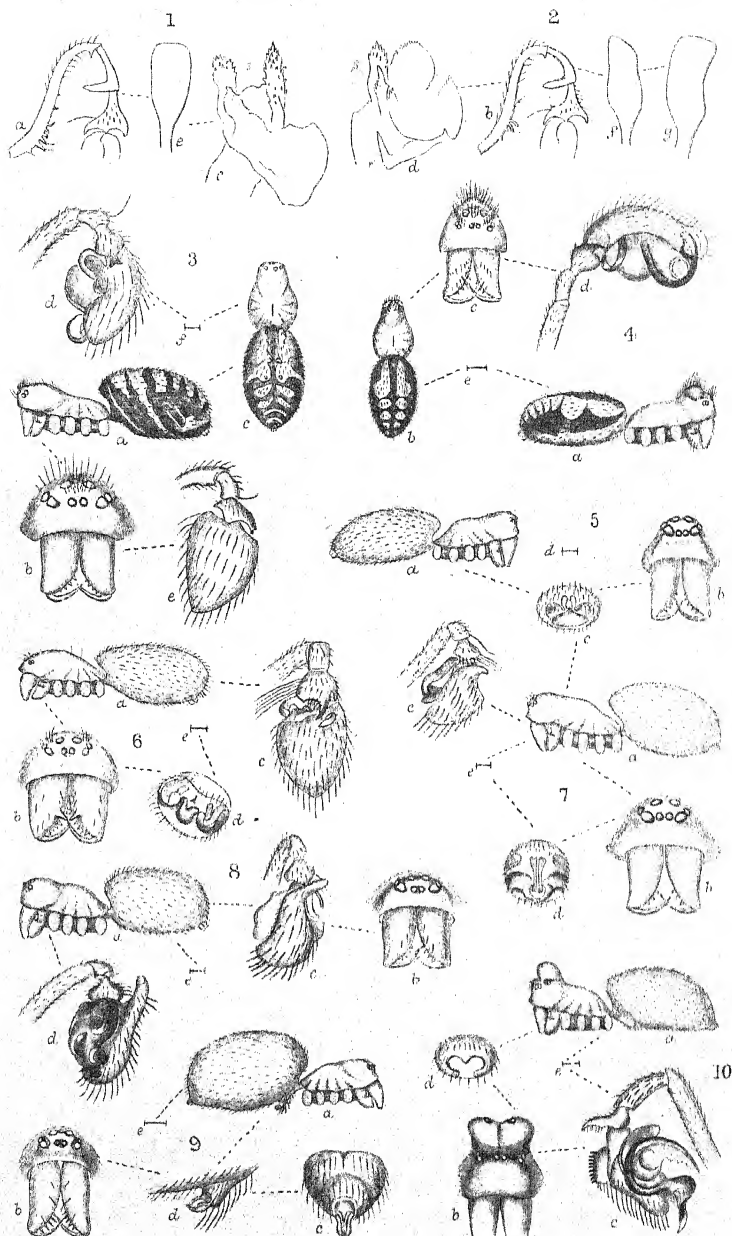
There were only two examples of this species in the fine collection recently sent home by Mr. Sadler. I believe, however, that two other examples exist in the collection of Dr. Anderson. The species is a very beautiful one.

##### Genus CADPHISES.

##### CADPHISES MOOREI, n. sp.

Wings black, with purplish reflections, the entire surface covered





O.P. Comins del.  
A.T. Hollick lith.

NEW SPECIES OF ERIGONE.  
from North America

W. West & Co. engr.

by innumerable cream-coloured spots, which towards the base are arranged in parallel longitudinal rows, about seven in primaries, and six to seven in secondaries; body greenish black; the head, collar, pterygodes, and thorax spotted with silvery white; abdomen spotted with white at the base and sides; palpi and pectus spotted with white, basal segments of venter margined with white, anal segments covered by a wax-like testaceous plate; expanse of wings 3 inches 5 lines.

Darjeeling (*Sadler*).

Type, B.M.

Easily distinguished from *C. maculata* by its greater size, the more purplish colour of the wings, and the absence of the ochreous colouring on abdominal area of secondaries. I have named it after the author of the genus.

### Family LIPARIDÆ.

#### Genus DREATA.

#### DREATA TRISERIATA, n. sp.

♂. Nearly allied to *D. subcurvifera*, but larger, altogether yellower in colour, and with scarcely a trace of the two submarginal rows of black spots in secondaries.

Above, head and thorax densely hairy, bright straw-coloured; antennæ brown; primaries straw-coloured, with a subcostal, a bent central, and an arched submarginal series of larger black spots, the last two series meeting near the apex; abdomen and secondaries golden testaceous, the latter with two indistinct disco-submarginal parallel squamose blackish lines: body and wings below sordid ochraceous; sides of pectus and fringe of wings bright stramineous; expanse of wings 2 inches 6 to 9 lines.

Pulni Hills, S. India 8000 feet (*A. F. Sealy*). Five examples, B.M.

Mr. Sealy informs me that this species is not at all rare, and is easily captured, as it flies into the house; all the examples taken by him are males. The allied species, *D. subcurvifera*, Walker, is an inhabitant of Ceylon.

### 5. On some new Species of *Erigone* from North America.

By the Rev. O. P. CAMBRIDGE, M.A., C.M.Z.S.

[Received May 4, 1875.]

(Plate XLVI.)

Since the publication of descriptions of new species of *Erigone* from North America (P. Z. S. 1874, p. 428, pl. lv.), Mr. J. H. Emerton has kindly sent me another small collection, containing nine additional species; one only of these (*E. viaria*, Bl.) is identical with any known European form, though several of the others are very closely allied to species found in England and France. One of the chief points of interest attaching to the present collection is in regard to two of the species (*E. ornata* and *E. pictilis*): in these an un-

usual character is furnished in the very distinct and strongly marked pattern on the upperside of the abdomen; very few European species, discovered hitherto, present any thing like a regular pattern, while the majority have a merely unicolorous abdomen.

I take this opportunity of again returning my kind thanks to Mr. Emerton for allowing me to describe and figure portions of these very interesting little Spiders, and I also make bold to express a hope that through his exertions I may soon have the pleasure of making known other new forms of the same genus.

*ERIGONE PERSIMILIS*, sp. n. (Plate XLVI. fig. 1.)

*Erigone atra*, Cambr. P. Z. S. 1874, p. 429 (exclude synonym there quoted).

Adult male, length  $1\frac{1}{3}$  line.

This Spider is very closely allied to *E. atra*, Bl. (*E. vagabunda*, Westr.), resembling it (as well as some other kindred species) in size, colours, general form, and structure. Its distinctness was overlooked *l. c. supra*; it may, however, be distinguished from that species, on a closer examination, by the caput having a median longitudinal row of three distinct tooth-like tubercles, each of which is furnished with a short bristle; the form also of the fore extremity, on the upperside of the radial joint of the palpus, differs slightly, but characteristically (see fig. 1 *e*, fig. 2 *g*, representing that of *E. atra* from a similar point of view); on the middle of the underside also of the radial joint in *E. atra* is a very slight, indeed, but perceptible, rudimentary tooth, or tubercle, while no trace of it appears to exist in the present Spider; the denticulation also of the humeral joint differs, the teeth not being so even in size or distribution as in *E. atra*; the palpal organs appear to be very similar; but probably a lens of higher power than that under which I have been able to examine them would show some important structural differences.

An adult male was received in June 1874 from Mr. J. H. Emerton, by whom it was found at Swampscott, Boston, Massachusetts, under a stone; and a comparison recently made of the present Spider with that recorded as *E. atra* (P. Z. S. 1874, p. 429) proves the two to be identical.

*ERIGONE DENTIGERA*, Cambr. (Plate XLVI. fig. 2.)

*Erigone dentigera*, Cambr. P. Z. S. 1874, p. 429.

Adult male, length  $1\frac{1}{3}$  line.

This species is exceedingly nearly allied to *E. persimilis*, as well as to *E. atra* (Bl.); but it may be distinguished by its shorter legs and palpi, the cubital and radial joints of the palpus being much shorter in proportion; the latter (radial) joint has also a distinct conical tooth near the middle of its underside; the form also of the fore extremities on the upperside of this joint differs, being narrower and more pointed, though still obtuse; and the denticulation of the humeral joint differs, the teeth in the present species being fewer and blunter; the palpal organs also differ when viewed under a strong

lens; figure 2 *d* represents those of the present species, and 1 *c* those of *E. persimilis*; these two figures are taken from a sketch of each in a similar position, under a high power, by Mr. Emerton. The caput has a central longitudinal row of tuberculiform denticulations, like those of *E. persimilis*, but of a smaller size.

Mr. Emerton remarks upon the darker and peculiar colour of this Spider when compared with *E. persimilis*; but this character, as far as it has yet been ascertained, is no certain specific criterion in the Spiders of this group; a long series of two well-known species (*E. dentipalpis*, Wid., and *E. atra*, Bl.), will furnish every variety of depth of colouring.

In regard to the present species, other minor differences are observable on a careful comparison with *E. persimilis* and other, nearly allied, species. These differences will have to be carefully noted when the numerous Spiders of this group come to be monographed; but for the present purpose the differential characters detailed above and in P. Z. S. 1874, p. 429, will be found sufficient for specific determination.

An adult male was received from Mr. Emerton, by whom it was found at Troy, near Boston, Massachusetts, U. S. A.; and a comparison of it, lately made, with the example described P. Z. S. *l. c.* shows the identity of the two. The present description notices the difference from *E. persimilis* (Cambr.), while that in P. Z. S. *l. c.* differentiates it from *E. longipalpis*, Sund., and some other species.

ERIGONE ORNATA, sp. n. (Plate XLVI. fig. 3.)

Adult male, length  $1\frac{1}{4}$  line.

This species is very closely allied to *Erigone pictilis* (p. 396), resembling it very nearly in the pattern on the abdomen; the darker portion of it, however, is more mottled and marked with pale yellow, and an uninterrupted oblique and slightly curved stripe traverses each side. It may also be at once recognized from *E. pictilis* by the absence of the occipital elevation; the occiput being only a very little, and uniformly, gibbous, or rounded, and, when looked at from above the caput, is less compressed laterally near its lower margins. The cephalothorax is glossy, and of a deep yellow-brown colour; and the caput has a few erect hairs on its upper part, as well as some others, directed a little backwards, on the ocular area; the height of the clypeus is half that of the facial space.

The eyes are of moderate size, and relatively not greatly different from each other; they are in the ordinary position; those of the hinder row are equidistant from each other, being separated by spaces equal to the diameter of one of the hind centrals, those of each lateral pair are obliquely placed and contiguous to each other, the fore lateral eye being larger than the hind lateral; those of the fore central pair are the smallest and darkest-coloured, near together, but not contiguous to each other, and each of them is separated from the fore lateral eye on its side by an interval equal to its diameter; the front row of eyes is much the shortest, and, looked at from above, straight.

The legs are not very long, but tolerably strong; their relative

length appears to be 4, 1, 2, 3; they are of an orange-yellow colour, and are furnished with hairs and two or three short fine spines; one of these latter, on the outer side, near the middle of the tibia of each of the fourth pair, is much less strong than the corresponding one in *E. pictilis*.

The *palpi* are short, and similar in colour to the legs; the cubital and radial joints are very short, but of about equal length, the latter being the stoutest; a single, rather upturned, slender bristle issues from the fore extremity on the upperside of the cubital joint; and the radial joint has its fore extremity, rather on the outer side, produced into a short apophysis, whose extremity is obtuse and bifid, or emarginate; the digital joint is large, and the palpal organs complex, very similar to those of *E. pictilis*, but the spines and spiny processes are not so strong.

The *falces* are tolerably strong, but not very long; they are similar to the cephalothorax in colour, and armed with fine teeth on their inner margins, towards the extremity.

The *maxillæ* and labium are slightly paler in colour than the *falces*; but their form is normal.

The *sternum* is heart-shaped, convex, and glossy, of a very deep reddish yellow-brown colour, and thickly clothed with longish hairs.

The *abdomen* is oval, and projects over the hinder slope of the cephalothorax; its colour is blackish, with a pattern similar to that on the abdomen of *E. pictilis*, differing slightly, as above observed. About the middle of the upperside are four small reddish impressed spots, forming a quadrangular figure, whose fore side is slightly shorter than the three others; the surface of the abdomen is thinly furnished with short hairs, and there are two or three rather strongly marked transverse curved folds just above the anal prominence; the spinners are very short and of a pale yellowish hue.

Two adult males of this Spider were received from Mr. J. H. Emerson, by whom they were found under leaves at Providence, Massachusetts, U. S. A., in November 1871.

ERIGONE PICTILIS, sp. n. (Plate XLVI. fig. 4.)

Adult male, length nearly  $1\frac{1}{2}$  line.

The *cephalothorax* is of a yellow-brown colour, and of ordinary general form, but the caput has its occiput a little elevated, the hinder slope of the elevation, looked at in profile, rounded and gradual, while the front slope is rather abrupt, forming (in profile) with the fore part of the caput a somewhat angular hollow; the height of the clypeus, which is full, rounded, and slopes a little forward, exceeds half that of the facial space; the upper part of the caput is clothed with numerous bristly hairs directed forward, others of a similar nature occupying the ocular region and directed upwards and rather backwards.

The *eyes* are not very large, nor very unequal in size; they are placed in four pairs, or two transverse rows, of which the hinder one (looked at from the front) is strongly curved, and the foremost much the shortest and nearly straight; those of the hinder row are about



equidistant from each other, the hind centrals being each placed immediately in front of a round shining pale-coloured tubercle; those of each lateral pair have a round shining tubercle behind them, they are contiguous to each other, and obliquely placed; and from behind each of these pairs a longitudinal narrow indentation, fringed with a row of bristly hairs, runs backwards and obliquely upwards towards the hinder part of the occiput; the eyes of the fore central pair are smallest of the eight, near together, but not contiguous to each other, and each is separated from the fore lateral eye nearest to it by nearly the diameter of the latter.

The *legs* are moderate in length and strength; their relative lengths appear to be 4, 1, 2, 3; they are of a pale dull yellow colour, furnished with hairs and one or two fine black spines.

The *palpi* are short and similar in colour to the legs, except the digital joint, which is suffused with brown; the cubital and radial joints are very short; the latter is a little roundly produced at the fore extremity on its outer side, where it has a not very large pointed apophysis; the digital joint is very large, and has a strong lobe towards the fore extremity on the outer side; the palpal organs are well developed and complex, a strong black tapering spine issues from their midst, and curving round inwards, almost encircles their fore extremity, and within its curve is a smaller spine coiled in a circular form.

The *falces* are rather paler in colour than the cephalothorax; they are tolerably long and strong, a little rounded in their profile-line, and divergent towards their extremities when looked at from the front; they are furnished with a few minute teeth towards their extremities on the inner margin, and close above them three bristles in a single row directed downwards.

The *maxillæ* are of normal form, similar to the legs in colour, and furnished with some long and strong bristles towards their outer sides.

The *labium* is also of normal form, and (with the sternum, which is heart-shaped, convex, and bristly) is of a dark brown colour.

The *abdomen* is oval, tolerably convex above, and projects but very slightly over the base of the cephalothorax; almost unique hitherto among the numerous species of this genus, it has, like the foregoing species, a strong well-defined pattern on its upperside, very nearly resembling that of *Amaurobius ferox* (C. Koch); its colours are black and dull yellow, tinged (in four examples) with a slight reddish hue; and according as one or the other of these colours prevail, either may be described as the ground-colour. In the example now figured and described (Plate XLVI. fig 4), the ground-colour of the upperside is black, the fore half has two large yellowish patches on either side, followed by a series of slightly oblique spots or blotches of a similar colour, arranged in pairs, and diminishing in size as they approach the spinners; the sides are black, divided by an indistinct oblique yellowish gap; and the underside is dull yellowish, the central longitudinal line being clouded with a dusky hue. When the yellow prevails, the black forms a central longitudinal bar, from the hinder half of which a series of several oblique lateral bars issue on either

side, diminishing in length towards the spinners; the abdomen is thinly clothed with short hairs.

The *female* resembles the male in colours and markings; but the occiput wants the bristly elevation so characteristic of the male.

Adults of both sexes of this fine and very interesting Spider, found on pine and juniper trees, were received from Mr. J. H. Emerton, by whom they were captured at Beverley, Swampscott, Boston, Massachusetts, U. S. A., in May 1874.

ERIGONE PROVIDA, sp. n. (Plate XLVI. fig. 5.)

Adult female, length rather more than 1 line.

The cephalothorax, falces, and sternum of this Spider are of a rather dark yellow-brown colour; the legs are brightish orange-yellow, the palpi, maxillæ, and labium dull yellow, suffused with brown; and the abdomen blackish yellow-brown, tinged with olive.

The form of the *cephalothorax* is of the ordinary type; the profile-line from the eyes to the thoracic junction almost level, with a slight dip or hollow close behind the occiput; the normal grooves and indentations are distinctly but not very strongly marked; and the height of the clypeus, which is a little impressed just below the eyes, is equal to half that of the facial space.

The *eyes* are on black spots in the usual position, of tolerable size; and although closely grouped together, they occupy the whole width of the fore part of the caput; those of the hinder row are equidistant from each other, being separated by an interval not much, if any, greater than half the diameter of one of the central pair; those of each lateral pair (of which the foremost is the largest of the eight) are obliquely placed on a slight tubercle, and contiguous to each other; the foremost one is also contiguous (or as nearly so as possible) to the fore central eye nearest to it, the fore centrals also being contiguous to each other, and the smallest of the eight; the two pairs of lateral eyes thus form, with the fore central pair, a continuous curved line; and the interval between each of these last and the hind central eye nearest to it is equal to the diameter of the latter.

The *legs* are moderate in length and strength; their relative length appeared to be 4, 1, 2, 3; and they are furnished with hairs and slender bristles.

The *falces* are strong and of tolerable length, a little inclined towards the labium, and (as far as could be ascertained, though not with absolute certainty) armed with small teeth on the inner margin towards the extremity.

The palpi, maxillæ, labium, and sternum present no unusual or distinctive feature in form or structure.

The *abdomen* is of rather an elongate oval form, and not very convex above, nor projecting much over the base of the cephalothorax; it is of a dull greenish-black yellow-brown hue, marked (like many others) with pale lines and spots on the upperside, probably not visible except through spirit of wine; the form of the genital aperture is simple but characteristic.

Two examples of this species, which is nearly allied to *E. cornu-*

*palpis*, were received from Mr. Emerton, by whom they were found under leaves at Swampscott, Boston, U. S. A., in March 1874.

*ERIGONE PERTINENS*, sp. n. (Plate XLVI. fig. 6.)

Adult male, length very nearly  $1\frac{1}{2}$  line.

The cephalothorax, *falces*, *maxillæ*, *labium*, and sternum of this Spider are of a yellow-brown colour, the sternum, however, being rather more suffused with brown; the colour of the legs and *palpi* is yellow, the digital joints of the latter yellow-brown, and the abdomen dull brownish black, with an olive hue. The *cephalothorax* is of ordinary general form; the profile line forms an almost uniform curve, of which the highest part is at the occiput; the normal indentations and grooves are not strongly marked, and the lateral constriction of the lower margins of the caput is very slight; the clypeus projects forwards, forming a continuous portion of the profile-curve, and its height equals half that of the facial space.

The *eyes* are in the ordinary position, of moderate size, and relatively not greatly different, those of the fore central pair being, as in most other species, the smallest; those of the hinder row are equidistant from each other, the intervals separating them being equal to about an eye's diameter; those of the fore central pair are near together, but not contiguous to each other, and each is slightly over its own diameter's distance from the fore lateral on its side, and is separated from the hind central nearest to it by an interval equal to the diameter of the latter; those of each lateral pair are obliquely placed and contiguous to each other, the fore one being apparently the largest of the eight.

The *legs* are not very strong, but rather long; their relative length is 4, 1, 2, 3; they are well furnished with hairs, bristles, and longish, slender, bristle-like spines.

The *palpi* are short; the radial and cubital joints are of equal length, the former is the strongest, and has a curved spine-like pointed apophysis at the middle of its fore extremity, pointing downwards, outwards, and rather backwards; the outer side of the radial joint is furnished with some long bristly hairs; the digital joint is rather large, and has a small, pointed, somewhat spine-like apophysis near its base on the inner side, its point having the same direction, and not far removed from the point of that at the extremity of the radial joint; the palpal organs are prominent and complex, with corneous and spiny processes.

The *falces* are of moderate length and strong; each is armed with a strong tooth in front on the inner side, with apparently a small tubercular prominence underneath, near its base; they are also furnished with teeth along the inner margin of the fore half.

The form of the *maxillæ*, *labium*, and sternum is normal.

The *abdomen* is oval, moderately convex above, and projects fairly over the base of the cephalothorax; it is of a dull black-brown colour, tinged with olive-green, and is pretty well clothed with longish coarse hairs.

The *female* resembles the male in form and colours; the *falces*,

however, are destitute of the single characteristic tooth on the inner side of their front surface; and (in spirits of wine) the abdomen is pretty distinctly marked with various lines and mottlings of dull yellow, very faintly indicated in the male; the sexual aperture is furnished with a short prominent process of a characteristic form, impossible to describe clearly, and not easy to delineate certainly; fig. 6*d* is an attempt to represent its appearance slightly in perspective.

This species is allied to *E. livida*, Bl., as well as to *E. subtilis* (Cambr.) and others, but cannot be confused with them if the profile of the cephalothorax, the armature of the falces, and the form of the radial joint of the palpus and the palpal organs be carefully observed.

An adult of each sex was received from Mr. Emerton, by whom they were found under a stone, below high-water mark, at Peaks Island, Boston, Massachusetts, U. S. A., in August 1873.

ERIGONE PERSOLUTA, sp. n. (Plate XLVI. fig. 7.)

Adult male, length rather over 1 line.

The cephalothorax, falces, and maxillæ of this Spider are of a yellow-brown colour, the margins of the cephalothorax being blackish; the legs and palpi (except the digital joints of the latter, which are yellow-brown) are of a dull orange-yellow colour; the labium and sternum are suffused with blackish brown; and the abdomen is dull black, with a strong olive-green tinge, marked (in spirits of wine) with fine pale spots and lines.

The form of the *cephalothorax* is of the ordinary type; looked at in profile, the line from the foremost eyes to the thoracic junction is a gentle curve with a very slight hollow at the occiput; the height of the clypeus, which is a little prominent at its lower margin, rather exceeds half that of the facial space.

The *eyes* are of tolerable size, and in the usual position, on black spots, but rather closely grouped together; those of the front row are very nearly contiguous to each other; those of the hind central pair are separated by an interval not quite equal to an eye's diameter, and each is separated from the hind lateral eye on its side by an interval rather less than that which divides those of the hind central pair; those of each lateral pair are obliquely placed, contiguous to each other, and apparently the largest of the eight; each of the fore centrals is separated from the hind central eye nearest to it by a space equal to its own diameter.

The *legs* are of tolerable length and strength, their relative length being 4, 1, 2, 3; they are furnished with hairs, bristles, and a few fine spines.

The *palpi* are not very long, the radial and cubital joints very short, the former being the strongest; it is largest at its fore extremity, but has no apophysis; and among other, finer hairs it has several longer and stronger bristly ones issuing from its fore extremity, near the outer side; the cubital joint has a single slightly sinuous bristle at its fore extremity, a little towards the outer side; the digital joint

is large, and has its hinder extremity produced into a curved horn-like projection, its point being red-brown, apparently of a corneous nature, and directed outwards. The palpal organs are highly developed, prominent, and complex; two bright red-brown strong corneous processes are most noticeable, one of them curved or folded in a circular form at their base on the outer side; the other, longer and stronger, issues from their inner extremity, and, running backwards, curves round their base.

The *falces* are moderate in length and strength; they are directed backwards towards the labium, and are armed with a few minute teeth on their inner edge near the extremity.

The *maxillæ*, *labium*, and sternum are of normal form.

The *abdomen* is oval, tolerably convex above, and projects fairly over the base of the cephalothorax; it is of a greenish black colour, mottled and lined with pale yellowish (when seen through spirits of wine) and thinly clothed with hairs.

The *female* resembles the male in colours and general characters; and the genital aperture is rather complex in its form.

This species is very nearly allied to the European form, *E. conigera* (Cambr.), but may, among other characters, be easily distinguished by the less strong and more curved process at the base of the digital joint, as well as by a quite different structure of the palpal organs.

Examples of this Spider were received from Mr. Emerton, by whom they were found under leaves at Swampscott, near Boston, U. S. A., in March 1874.

ERIGONE CORNUPALPIS, sp. n. (Plate XLVI. fig. 8.)

Adult male, length  $1\frac{1}{4}$  line.

The cephalothorax, *falces*, and *maxillæ* of this Spider are of a yellow-brown colour; the legs and palpi dull orange-yellow, tinged slightly with brown; the labium and sternum dark yellow-brown; and the abdomen dull blackish, tinged with olive-green.

The form of the *cephalothorax* is of the ordinary type; a very slight dip or hollow is observable in the profile-line just behind the occiput; and the normal grooves and indentations are distinct, but not strongly marked; the height of the clypeus, which slightly projects, is equal to half that of the facial space.

The *eyes* are rather large, on black spots, and closely grouped together in the usual position; those of the hinder row are separated by as nearly as possible equal intervals of half a hind central eye's diameter; those of each lateral pair are placed obliquely on a tubercle, the foremost of these pairs are the largest of the eight, and each is separated from the fore central eye on its side by an interval not much exceeding half the diameter of the latter; those of the fore central pair are smallest of the eight, very near, but not quite contiguous to each other.

The *falces* are strong and of tolerable length; they are very nearly vertical; and each appeared to have; on the outer side of its front surface, a longitudinal row of minute fine tooth-like spines; there are

also several of the ordinary teeth on the inner margin towards the extremity.

The *legs* are tolerably long and strong; their relative length appeared to be 4, 1, 2, 3; and they are furnished thinly with hairs, bristles, and a spine on each of the genual and tibial joints of those of the fourth pair.

The *palpi* are rather short, tolerably strong, similar to the legs in colour, except the digital joint, which is of a yellow-brown hue; the cubital joint is short, and has a single, strongish, sinuous, prominent, tapering bristle at the fore extremity of its upperside; the radial joint is of the same length as the cubital, but much stronger, being rather gibbous at its fore extremity almost all round, but most strongly in front, though there is no distinct apophysis; the digital joint is large, and has its hinder extremity produced into a longish and strong, tapering, but obtusely pointed, curved horn-like projection, the point directed outwards; there is also a large obtuse lobe-like prominence on the outer side, divided into two or three lesser lobes; the palpal organs are prominent and complex, a strong, somewhat folded, crescent-shaped, corneous process being placed at their base on the outer side; this process has a black, sharp-pointed, tooth-like prominence at the middle of its strongest part.

The *maxillæ*, *labium*, and *sternum* are of normal form.

The *abdomen* is oval, pretty convex above, and projects slightly over the base of the cephalothorax; it is of a dull greenish black hue, marked with pale lines and mottlings (probably not visible except in spirits of wine), and thinly clothed with hairs.

A single example was received from Mr. Emerton, by whom it was found at Brookline, Massachusetts, U. S. A., in 1870. It is very nearly allied to *Erigone retroversa* (Cambr.), a French species, but is quite distinct. It is also allied to *E. cornigera*, Bl., and *E. persoluta*, Cambr. (*ante*, p. 400).

#### ERIGONE MULTESIMA, n. sp. (Plate XLVI. fig. 9.)

Adult female, length  $1\frac{2}{3}$  line.

The whole of the fore part of this Spider, including the legs and palpi, is of a bright orange-yellow colour, except the sternum, which is somewhat suffused with brown, and the abdomen is black.

The form of the *cephalothorax* is ordinary, and its profile-line describes a slight curve; the normal grooves and indentations are distinct, but not strongly marked; the thoracic junction is indicated by a curved blackish line, the convexity of the curve directed backwards; the clypeus is a little impressed or hollow (in profile) just below the eyes, and its height is equal to half that of the facial space.

The *eyes* are of moderate size and in the usual position, on black tubercles; those of the hinder row are equidistant from each other, the intervals being equal to the diameter of one of its central pair; the fore laterals are largest of the eight, and are, with the hind laterals, placed obliquely on a strongish tubercle; those of the fore central pair are smallest of the eight, very near, if not quite contiguous, to each other, and each is separated from the fore lateral eye

on its side by an interval equal to its own diameter, and from the hind central nearest to it by an interval equal to the diameter of one of the fore laterals.

The *legs* are tolerably long, slender, and furnished with hairs, bristles, and a few longish fine spines on those of the fourth pair; their relative length is 4, 1, 2, 3.

The *falces* are long and strong, slightly hollowed on the outer sides (when looked at from the front), and a little divergent at their extremities; they are armed on their inner edge, towards the extremities, with a double row of teeth, those of the front row rather long and strong, of the hinder row minute.

The *maxillæ* are strong, a little curved, and inclined, but not very strongly, towards the labium.

The *abdomen* is large, oval, very convex above, and projects fairly over the base of the cephalothorax; it is black, thinly clothed with fine hairs, the spiracular plates and corpus of the epigyne (which is prominent and of characteristic form) dull yellow-brown; the extremity of the genital process is bright red-brown.

A single example of this Spider, which appears to belong to the group characterized (and probably rightly) as a separate genus by Menge, under the name *Bathypantes*, was received from Mr. Emerton, by whom it was found under a stone at Brighton, Boston, U. S. A., in April 1873.

#### ERIGONE VIARIA.

*Neriene viaria*, Bl. Spid. Great Brit. & Ireland, p. 255, pl. xviii. fig. 171.

*Erigone quisquiliarum*, Westr. Araneæ Suecicæ, p. 277.

Adults of both sexes of this Spider were received from Mr. Emerton, by whom they were found under leaves at Brookline, Massachusetts, U. S. A., in March 1874. These examples present no variation whatever from the English and continental examples of this species.

#### ERIGONE FLORENS, sp. n. (Plate XLVI. fig. 10.)

Adult male, length  $1\frac{1}{4}$  line.

The cephalothorax of this pretty and very distinct species, as well as the palpi, falces, maxillæ, labium, and sternum, are of a bright shining orange-yellow colour; the femora of the legs are of a similar colour, the genual, tibial, and metatarsal joints being strongly suffused with brownish black, while the tarsi are of a dusky yellowish hue, and the abdomen black. The *caput* has a large strong eminence, broader at the top (when looked at from the front) than at its junction with the caput itself, and divided into two large well-rounded lobes by a longitudinal depression; immediately behind each lateral pair of eyes is a large and deep indentation, or excavation, running longitudinally backwards, and running out to a point near the occiput; at the larger or fore end of this excavation is a small, round, shining, eye-like fovea or impression; the clypeus is broad, bold, and well-rounded, and prominent at its lower side, its height being about half that of the facial space; the fore

side of the eminence on the caput, as well as the upper part of the fore extremity of the caput itself, is clothed with a few short hairs, directed forwards and downwards.

The *eyes* are small, placed in the usual four pairs, on black spots; those of the upper or hind central pair are placed on the fore side of the summit of the cephalic eminence, each being rather more than a diameter's distance from the longitudinal line which divides its two lobes from each other; the other three pairs (looked at either in front or sideways) form a transverse straight line at the fore extremity, on the upperside of the caput, rather exceeding in length that formed by each lateral pair and the hind central eye on its side; those of each lateral pair are placed a little obliquely on a slight tubercle; those of the fore central pair are near together (but not contiguous to each other) on a tubercle.

The *legs* are long and slender, coloured as described above, and furnished with hairs, and some fine spines beneath the tibiae of the first and second pairs; their relative length is 1, 4, 2, 3.

The *palpi* are tolerably strong and moderate in length; the cubital joint has some short spine-like bristles on its outer side, it is slightly bent downwards, and about double the length of the radial, which has its fore extremity on the upperside prominently produced into a moderately long tapering apophysis, curved downwards, and its margins fringed with hairs; the digital joint is large, and of an irregular form, and suffused with brown; it has a strong, prominent, somewhat keel-like lobe at its base on the outer side, furnished with a single row of very short, but strong, closely set, curved, spine-like bristles; the palpal organs are highly developed, prominent, and complex; a large corneous process projects from their extremity, and a strong, black, tapering spine issuing from its base curves in a circular form backwards on their outer side; in connexion with this spine, quite to its point, there is some yellowish diaphanous membrane; above the spine just noted, at the base of these organs, on their outer side, are two other large irregular corneous processes.

The *falces* are tolerably strong, but not very long; they are of a conical form, directed backwards towards the labium, and furnished with a few very minute teeth on the inner margin near their extremities.

The *maxillae*, *labium*, and *sternum* are of normal form.

The *abdomen* is large, of a roundish oval form, tolerably convex above, and of a glossy black colour; the spiracular plates being yellow; it projects a little over the base of the cephalothorax, and is clothed thinly with very short hairs, its surface being thickly covered with very minute puncture-like impressions, four of a larger size forming on the middle of the upperside a rectangular figure whose fore side is shortest.

The *female* resembles the male in colours and general characters; but the cephalothorax is devoid of the cephalic eminence, the abdomen is more convex above, and the spines on the tibiae (and metatarsi as well) of the first two pairs of legs are of a more marked character; the palpi have, among other hairs and bristles, a row of



spine-like bristles round the fore extremity, on the upperside of the radial joint, forming a kind of *chevaux-de-frise*; the genital aperture is of a simple but characteristic form.

An adult male and twelve females were received from Mr. J. H. Emerton, by whom they were found at Ipswich, near Boston, Massachusetts, U. S. A., in June 1874.

#### LIST OF SPECIES DESCRIBED.

1. *Erigone persimilis*, sp. n., ♂, p. 394, Plate XLVI. fig. 1.
2. — *dentigera* (Camb.), ♂, p. 394, Plate XLVI. fig. 2.
3. — *ornata*, sp. n., ♂, p. 395, Plate XLVI. fig. 3.
4. — *pictilis*, sp. n., ♂ & ♀, p. 396, Plate XLVI. fig. 4.
5. — *provida*, sp. n., ♀, p. 398, Plate XLVI. fig. 5.
6. — *pertinens*, sp. n., ♂ & ♀, p. 399, Plate XLVI. fig. 6.
7. — *persoluta*, sp. n., ♂ & ♀, p. 400, Plate XLVI. fig. 7.
8. — *cornupalpis*, sp. n., ♂, p. 401, Plate XLVI. fig. 8.
9. — *multesima*, sp. n., ♀, p. 402, Plate XLVI. fig. 9.
10. — *viaria*, Bl., ♂ & ♀, p. 403.
11. — *florens*, sp. n., ♂ & ♀, p. 403, Plate XLVI. fig. 10.

#### EXPLANATION OF PLATE XLVI.

Fig. 1. *Erigone persimilis* ♂.

*a*, part of right palpus, from the outer side; *c*, palpal organs, very highly magnified; *e*, radial joint of right palpus, from above and behind.

2. *Erigone dentigera* (Camb.) ♂.

*b*, part of right palpus, from outer side; *d*, palpal organs, very highly magnified; *f*, radial joint of right palpus, from above and behind; *g*, radial joint of right palpus of *Erigone atra*, Bl., also from above and behind.

3. *Erigone ornata* ♂.

*a*, Spider in profile; *b*, caput and falces, from the front; *c*, upperside of Spider; *d*, left palpus, from outer side, rather in front; *e*, ditto, from inner side, also rather in front; *f*, natural length of Spider.

4. *Erigone pictilis* ♂.

*a*, Spider in profile; *b*, upperside of cephalothorax and abdomen; *c*, caput and falces, from the front; *d*, right palpus, from outer side, rather underneath; *e*, natural length of Spider.

5. *Erigone provida* ♀.

*a*, profile of Spider; *b*, caput and falces, from the front; *c*, genital aperture; *d*, natural length of Spider.

6. *Erigone pertinens* ♂ & ♀.

*a*, profile (♂); *b*, caput and falces (♂), from the front; *c*, right palpus (♂), from the front; *d*, genital aperture (♀); *e*, natural length of Spider.

7. *Erigone persoluta* ♂ & ♀.

*a*, profile (♂); *b*, caput and falces (♂), from the front; *c*, left palpus (♂), from the front, on inner side; *d*, genital aperture (♀); *e*, natural length of Spider.

8. *Erigone cornupalpis* ♂.

*a*, profile; *b*, caput and falces, from the front; *c*, left palpus, from the front; *d*, right palpus on outer side in front; *e*, natural length of Spider.

9. *Erigone multesima* ♀.

*a*, profile; *b*, caput and falces, from the front; *c*, genital process; *d*, ditto, in profile; *e*, natural length of Spider.

10. *Erigone florens* ♂ & ♀.

*a*, profile (♂); *b*, caput and falces (♂), from the front; *c*, left palpus (♂) on outer side; *d*, genital aperture (♀); *e*, natural length of Spider.

6. A List of the Collection of Diurnal Lepidoptera made by Mr. J. J. Monteiro, in Angola, with Descriptions of some new Species. By HERBERT DRUCE, F.L.S., F.Z.S.

[Received May 10, 1875.]

The kindness of Mr. Monteiro has enabled me to compile the following list of his Butterflies, and to add examples of all the species to my collection. The collection was a rich one, containing one hundred and sixty-six species, many of which were new to science. So far as I know the Butterfly-fauna of Angola, it is more nearly allied to that of the Cape and Natal than to that of the west coast, though many species are common to both localities.

Subfamilia I. DANAINÆ, Bates.

Genus DANAIS, Latr.

D. LEONORA, Butl. P. Z. S. 1866, p. 51.

Genus AMAURIS, Hübn.

A. HYALITES, Butl. Cist. Ent. vol. i. p. 209 (1874).

Ambriz (*J. J. M.*).

Of this distinct species Mr. Monteiro only obtained three specimens, one of which, the type, is in the B.M. The other two are now in my own collection.

Genus MYCALESIS, Hübn.

1. M. SAFITZA, Hew. Gen. D. L. p. 394. n. 10, note.

2. M. VULGARIS, Butl. Cat. Sat. B. M. p. 130, t. 3. f. 2 (1868).

3. M. SANAOS, Hew. Ex. Butt. iii. *Myc.* t. 8. f. 51, 52 (1866).

4. M. ASOCHIS, Hew. *l. c.* t. 7. f. 46, 47 (1866).

5. M. ELIASIS, Hew. Ex. Butt. iii. *Myc.* t. 7. f. 44, 45 (1866).

Ambriz (*J. J. M.*).

6. M. DOROTHEA, Cram. Pap. Ex. iii. t. 204. f. E, F. (1782).

Genus YPTHIMA, Hübn.

1. Y. ASTEROPE, Klug, Symb. Phys. t. 29. f. 11-14 (1832).

2. Y. PHILOMELA, Joh. ? Amcen. Acad. vi. p. 404 (1764).

I cannot be sure that this Butterfly is rightly named; the collection contained a single specimen in very bad condition.

## Subfamilia III. ELYMNIINÆ, Herr.-Schäff.

## ELYMNIA, Hübn.

E. BAMMAKOO, Westw. Gen. D. L. p. 405. n. 12, note (1851).

A very distinct species, and nothing to do with *E. phegea*, Fab., with which it is frequently placed in collections. The sexes of both species are in my collection.

## Subfamilia VI. ACRÆINÆ, Bates.

## Genus ACRÆA, Fabr.

1. A. NEOBULE, Doubl. Hew. Gen. D. L. t. 19. f. 3 (1848).

Boma (*J. J. M.*). A fine series of this species was in the collection.

2. A. LYCIA, Fab. Syst. Ent. p. 464 (1775).

3. A. ABDERA, Hew. Ex. Butt. i. *Acr.* t. 1. f. 1, 2 (1852).

One specimen only.

4. A. ZETES, Linn. Syst. Nat. i. 2, p. 766 (1756).

Of this species there are several very interesting pale-coloured varieties.

5. A. PSEUDOLYCIA, Butl. Cist. Ent. p. 213 (1874).

Quanza (*J. J. M.*). A very distinct species.

6. A. SERENA, Fabr. Syst. Ent. p. 461 (1775).

Quanza (*J. J. M.*).

7. A. BONASIA, Fabr. *l. c.* p. 464.

8. A. EPONINA, Cram. Pap. Ex. iii. t. 268. f. A, B (1782).

Banana, January 1873 (*J. J. M.*).

9. A. RAHIRA, Boisd. Faune Mad. p. 33, t. 5. f. 4, 5 (1833).

10. A. LYCOA, Godt. Enc. Méth. ix. p. 239 (1819).

Bonny, July 1872 (*J. J. M.*).

11. A. CARMENTIS, Doubl. & Hew. Gen. D. L. t. 19. f. 1 (1848).

12. A. EURYTA, Linn. Mus. Ulr. p. 221 (1764).

13. A. MONTEIRONIS, Butl. Cist. Ent. p. 211 (1874).

Ambriz and Bembe (*J. J. M.*).

14. A. METAPROTEA, Butl. *l. c.* p. 211.

Ambriz (*J. J. M.*).

15. A. ARCTIFASCIA, Butl. Trans. Ent. Soc. 1874, p. 427.

16. *A. PSEUDOPTERA*, Butl. *l. c.* p. 428. n. 2.

17. *A. AMPHIPROTEA*, Butl. *l. c.* n. 3.

The above five species are very closely allied; and had not Mr. Butler and myself been able to find the sexes of each, I should have preferred considering them as all varieties of one variable species. I have a long series of most of them in my collection,

18. *A. EGINA*, Cram. Pap. Ex. i. t. 39. f. F, G (1776).

19. *A. FORMOSA*, Butl. Cist. Ent. p. 213 (1874).

Cabinda (*J. J. M.*).

20. *A. PSEUDEGINA*, Westw. Gen. D. L. p. 531 (1852).

The specimens are brighter-coloured than those from Sierra Leone; but the markings are just the same.

21. *ACRÆA LYGUS*, n. sp.

Upperside orange-brown. Anterior wing with the base, the spot at the end of the cell, two small spots below, and a short band of four spots near the costal margin, the apex and the outer margin black; posterior wing with the base and outer margin broadly black, a small black spot at the end of the cell, and a large pinkish white patch in the middle of the wing nearest the abdominal margin. Underside, anterior wing pale orange, a large black spot in the cell and one close to the base, the other spots as above, the black outer margin much narrower; posterior wing pinkish orange, almost pink at the base, crossed from the costal margin to the inner margin by two rows of black spots, the row nearest the base the largest, the outer margin broadly black, with a submarginal row of white spots.

Exp. 2 in.

Angola (*J. J. M.*).

Type, Mus. Druce.

#### Subfamilia VIII. NYMPHALINÆ, Bates.

##### Genus ATELLA, Doubl.

*A. PHALANTA*, Drury, Ill. Ex. Ent. i. t. 21. f. 1, 2 (1773).

##### Genus JUNONIA, Hübn.

1. *J. CLELIA*, Cram. Pap. Ex. i. t. 21. f. E, F (1775).

2. *J. CEBRENE*, Trim. Trans. Ent. Soc. 1870, p. 353.

Ambriz (*J. J. M.*).

##### Genus PRECIS, Hübn.

1. *P. OCTAVIA*, Cram. Pap. Ex. ii. t. 135. f. B, C (1779).

2. *P. CERYNE*, Boisd. Voy. Deleg. ii. p. 592 (1847).

3. *P. ARCHESIA*, Cram. Pap. Ex. iii. t. 219. f. D, E (1782).

Banana (*J. J. M.*).

4. *P. NATALICA*, Feld. Wien. ent. Mon. iv. p. 106 (1860).

The specimens of this species are smaller than any I have seen from Natal.

5. *P. CLOANTHA*, Cram. Pap. Ex. iv. t. 338. f. A, B (1782).

Genus *SALAMIS*, Boisd.

- S. ANACARDII*, Linn. Mus. Ulr. p. 236 (1764).

The specimens of this species are smaller than those from Natal, with a much deeper pink gloss over the wings.

Genus *KULLIMA*, Westw.

- K. RUMIA*, Westw. Gen. D. L. p. 325. n. 5, t. 52. f. 2 (1850).

Genus *EURYTELA*, Boisd.

1. *E. DRYOPE*, Cram. Pap. Ex. i. t. 78. f. E, F (1779).

Both sexes of this species were in the collection; the female is much paler-coloured than the male.

2. *E. HIARBAS*, Drury, Ill. Ex. Ent. iii. t. 14. f. 1, 2 (1782).

The specimens from Angola have the white band of the posterior wing much wider than those from Natal.

3. *E. OPHIONE*, Cram. Pap. Ex. ii. t. 114. f. E, F (1779).

Banana (*J. J. M.*).

Genus *ERGOLIS*, Boisd.

- E. ENOTREA*, Cram. Pap. Ex. iv. t. 236. f. A, B (1782).

Genus *HYPANIS*, Boisd.

- H. HITHYIA*, Dru. Ill. Ex. Ent. ii. t. 17. f. 1, 2 (1773).

A very variable species, common to the whole of Southern Africa.

Genus *DIADEMA*, Boisd.

1. *D. MISIPPUS*, Linn. Mus. Ulr. p. 264 (1764).

2. *D. SALMACES*, Dru. Ill. Ex. Ent. ii. t. 8. f. 1, 2 (1773).

3. *D. MONTEIRONIS*, Druce, Cist. Ent. p. 286 (1874).

The collection contained two specimens only of this fine new species, both of which are females.

4. *D. DUBIUS*, Beauv. Ins. Afr. Amér. p. 238, t. 6. f. 2, *a, b* (1805).

5. *D. ANTHEDON*, Doubl. Ann. Nat. Hist. xvi. p. 181 (1845).

## Genus GODARTIA, Luc.

1. *G. ANSELLICA*, Butl. Trans. Ent. Soc. 1870, p. 525.

The specimens of this species are small. "Found inland in open ground" (*J. J. M.*).

2. *G. TRAJANUS*, Ward. Ent. Mo. Mag. vol. viii. p. 36 (1871).

Three specimens only of this fine insect were taken by Mr. Monteiro, in the deep shade of the forest, about fifty miles inland.

## Genus PSEUDACRÆA, Westw.

1. *P. SEMIRE*, Cram. Pap. Ex. iii. t. 194. f. B, C (1780).

2. *P. EURYTA*, Linn.

3. *P. METAPTANEMA*, Butl. Cist. Ent. p. 215 (1874).  
*Ambriz (J. J. M.)*.

4. *P. FULVARIA*, Butl. *l. c.* p. 214 (1874).

5. *P. BOISDUVALII*, Doubl. Ann. Nat. Hist. xvi. p. 180 (1845).

A rare species in Angola. Mr. Monteiro only obtained two or three specimens.

## Genus NEPTIS, Fabr.

1. *N. SUCLAVA*, Boisd. Faune Mad. p. 49 (1833).

2. *N. MELICERTA*, Drury, Ill. Ex. Ent. ii. t. 19. f. 3, 4 (1773).

3. *N. NICOTELES*, Hew. Ent. Mo. Mag. p. 206 (1874).

4. *N. NEMETES*, Hew. Ex. Butt. iv. *Nep.* t. 1. f. 1, 2 (1868).

## Genus EURYPHENE.

1. *E. SOPHUS*, Fab. Syst. Ent. iii. 1, p. 46 (1793).

2. *E. MARDANIA*, Fab. *l. c.* p. 249.

The collection contained many specimens of both sexes of this species.

3. *E. PHANTASIA*, Hew. Ex. Butt. iii. *Eur.* t. 2. f. 9-11 (1865).

The female of this species was in the collection; it is nearly twice the size of the male, with the apex of the anterior wing white.

4. *E. PLAUTILLA*, Hew. Ex. Butt. iii. *Eur.* t. 3. f. 14 (1866).

5. *E. PLISTONAX*, Hew. Ex. Butt. v. *Eur.* t. 9. f. 38, 39 (1874).

Mr. Monteiro only obtained a single specimen of this remarkable species, which is now in the collection of Mr. Hewitson.

## Genus ROMALEOSOMA, Blanch.

1. *R. RUSPINA*, Hew. Ex. Butt. iii. *Rom.* t. 2. f. 6, 7 (1865).
  2. *R. INANUM*, Butl. Cist. Ent. p. 158 (1873).
  3. *R. XYPETE*, Hew. Ex. Butt. iii. *Rom.* t. 2. f. 8-10 (1865).
  4. *R. THEMIS*, Hübn. Samm. ex. Schmett. (1806-1816).
  5. *R. LOSINGER*, Hew. Ex. Butt. iii. *Rom.* t. 1. f. 5 (1864).
  6. *R. EUPALUS*, Fabr. Spec. Ins. ii. p. 54 (1781).
  7. *R. MEDON*, Linn. Syst. Nat. i. 2, p. 753 (1767).
- The specimens of this species are very fine.

8. *R. COPRATES*, n. sp.

Upperside dark chestnut brown, glossed with green; anterior wing with the costal margin and the apical half glossy greenish black, crossed near the apex by a white band, which is crossed by the black nervules, two distinct black spots in the cell; posterior wing with the outer margin broadly greenish-black, traversed by a band of seven greenish-white spots, the fringe of both wings alternately black and white, the nervules of both wings all black. Underside greenish brown, darkest on the outer margin of the wings; anterior wing with the white band as above, and three black spots in the cell; posterior wing with the costal margin greenish white, a black spot close to the base, and one in the middle of the cell, two white spots at the end of the cell, and the submarginal band of white spots, the same as above. The female the same as the male, only larger.

Exp. ♂  $2\frac{3}{4}$  in., ♀  $3\frac{3}{4}$  in.

Angola (*J. J. M.*).

Type, Mus. Druce.

This species is easily distinguished from *R. eleus* by its greener colour, and having black spots in the cells of both wings.

## Genus ATERICA, Boisd.

1. *A. AFER*, Drury, Ill. Ex. Ent. iii. t. 36. f. 1, 2 (1782).  
The collection contained the males only of this species.
2. *A. CLORANA*, Druce, Trans. Ent. Soc. 1874, p. 157.  
Ambriz, not common (*J. J. M.*).
3. *A. CUPAVIA*, Cram. Pap. Exot. iii. t. 193. f. E, F (1780).
4. *A. MELEAGRIS*, Cram. Pap. Ex. i. t. 66. f. A, B (1779).

The specimens of this species are very pale-coloured, with the white spots much smaller than the specimens I have from Old Calabar. Mr. Monteiro tells me that the species of this genus always fly in the dense forest.

Genus *HARMA*, Westw.

1. *H. THEODOLA*, Hew. Ex. Butt. iii. *Har.* t. 1. f. 3, 4 (1864).

This species I believe to be the male of *beckeri*; all the specimens I have examined of that species are females, and they agree in most respects on the underside. In all the collections that I have seen containing the one species the other is always with it.

2. *H. HESIODUS*, Hew. Ex. Butt. iv. *Har.* t. 4. f. 15-18 (1869).

A fine series of both sexes of this species was in the collection, with a very dark variety of the male, the black extending nearly over the whole of the wing.

"Rare in Angola, but abundant at Cabinda, North of the Congo" (*J. J. M.*).

3. *H. LURIDA*, Butl. P. Z. S. 1871, p. 80.

Both sexes of this species were in the collection.

4. *H. BECKERI*, Herr.-Schäff. Ex. Schmett. f. 81 (1852-1858).

5. *H. SANGARIS*, Godt. Enc. Méth. ix. p. 384 (1823).

Rare in Angola (*J. J. M.*).

6. *H. ADELINA*, Hew. Ex. Butt. iv. t. 3. f. 9, 11 (1869).

7. *H. CORSANDRA*, Druce, Trans. Ent. Soc. 1874, p. 158.

One specimen only in the collection.

8. *H. THEOBENE*, Doubl. & Hew. Gen. D. L. t. 40. f. 3 (1850).

9. *H. CŒNIS*, Drury, Ill. Ex. Ent. ii. t. 19. f. 1, 2 (1819).

Very common in the woods about fifty miles inland.

Genus *CHARAXES*, Ochs.

1. *C. POLLUX*, Cr. Pap. Ex. i. t. 37. f. E, F (1776).

2. *C. SATURNUS*, Butl. P. Z. S. 1865, p. 624, t. 36. f. 1.

3. *C. CASTOR*, Cr. Pap. Ex. i. t. 37. f. C, D (1776).

4. *C. BRUTUS*, Cr. *l. c.* iii. t. 241. f. E, F (1782).

5. *C. CANDIOPE*, Godt. Enc. Méth. ix. p. 357 (1823).

6. *C. EPHYRA*, Godt. *l. c.* p. 355.

Males only of this species were in the collection.

7. *C. TIRIDATES*, Cr. Pap. Ex. ii. t. 161. f. A, B (1779).

8. *C. BOHEMANI*, Feld. Wien. ent. Mon. iii. p. 321, t. 6. f. 3 (1859).

A fine series of this rare species was in the collection.



9. *C. NESIOPE*, Hew. Ex. Butt. i. *Nymph.* t. i. f. 5, 6 (1854).

Mr. Monteiro only obtained two or three specimens of this species.

10. *C. EUPALE*, Dru. Ill. Ex. Ent. iii. t. 6. f. 3 (1782).

Genus *PHILOGNOMA*, Westw.

1. *P. DECIUS*, Cram. Pap. Ex. ii. t. 114. f. A, B (1779).

2. *P. VARANES*, Cram. l. c. t. 160. f. D, E.

Very common always in the woods (*J. J. M.*).

Familia II. *LEMONIIDÆ*.

Subfamilia II. *NEMEOBIINÆ*, Bates.

Genus *ABISARA*, Feld.

1. *A. GERONTES*, Fabr. Spec. Ins. ii. p. 117 (1781).

2. *A. TANTALUS*, Hew. Ex. Butt. ii. *Sosp.* t. 1. f. 1 (1861).

Familia III. *LYCÆNIDÆ*, Steph.

Genus *PENTILA*, Westw.

*P. AMENAIIDA*, Hew. Ex. Butt. v. *Pent. & Lipt.* ii. f. 4-7 (1873).

Only a few specimens of this species come in the collection.

Genus *MIMACRÆA*, Butl.

*M. DARWINIA*, Butl. Lep. Exot. p. 104, t. 38. f. 8 (1872).

Two specimens only (♂, ♀), in the collection, mixed up with *Acræa pseudoptera*, which it closely resembles.

Genus *LIPTENA*, Doubl. & Hew.

1. *L. ACRÆA*, Doubl. & Hew. G. D. L. t. 77. f. 6 (1852).

2. *L. UNDULARIS*, Hew. Ex. Butt. *Pent. & Lipt.* f. 7 (1866).

3. *L. LIBYSSA*, Hew. l. c. f. 5, 6 (1866).

A very variable species.

Genus *ZERITIS*, Boisd.

*Z. HARPAX*, Fab. Syst. Ent. App. p. 809 (1775).

Genus *CUPIDO*, Schrank.

1. *C. ELOREA*, Fab. Ent. Syst. iii. 1, p. 191 (1793).

2. *C. CALICE*, Hopff. Ber. Verh. Ak. Berl. 1855, p. 642.

3. *C. OSIRIS*, Hopff. l. c. p. 642 (1855).

In this genus are several small species that I cannot with certainty determine.

Genus *HYPOLYCÆNA*, Feld.

1. *H. PHILIPPUS*, Fab. Ent. Syst. iii. 1, p. 283 (1793).
2. *H. LEBONA*, Hew. Ill. D. L. p. 51. n. 9 (1865).  
Quanza (*J. J. M.*).
3. *H. ANTIFAUNUS*, Doubl. & Hew. Gen. D. L. t. 75. f. 1 (1852).  
Only two specimens of this species.
4. *H. HATILA*, Hew. Ill. D. L. p. 51, t. 23. f. 21-24 (1865).
5. *H. FAUNUS*, Drury, Ill. Ex. Ent. ii. t. 1. f. 4, 5 (1777).
6. *H. ELEALA*, Hew. Ill. D. L. p. 52, t. 23. f. 25-27 (1865).

Genus *LYCÆNESTHES*, Moore.

1. *L. LARYDAS*, Cr. Pap. Ex. iii. t. 282. f. II (1782).
2. *L. LEGURES*, Hew. Trans. Ent. Soc. 1874, p. 349.
3. *L. LYZANIUS*, Hew. Ent. Mo. Mag. vol. xi. p. 36 (1874).  
Only two or three specimens in the collection.

Genus *JOLAUS*, Hübn.

- J. BOWKERI*, Trim. Trans. Ent. Soc. ser. 3, vol. ii. p. 176 (1864).  
The collection contained a fine series of this species.

Genus *LOXURA*, Horsf.

- L. SILENUS*, Fab. Syst. Ent. p. 531 (1775).

Familia IV. *PAPILIONIDÆ*, Leach.Subfamilia I. *PIERINÆ*, Swains.Genus *PONTEA*, Fabr.

- P. ALCESTA*, Cram. Pap. Ex. iv. t. 379 (1782).  
The specimens of this species are very small.

Genus *TERIAS*, Swains.

1. *T. BRIGITTA*, Cram. Pap. Ex. iv. t. 331. f. B, C (1782).
2. *T. PULCHELLA*, Boisd. Faun. Mad. p. 20, t. 2. f. 7 (1833).
3. *T. SENEGALENSIS*, Boisd. Sp. Gén. 672 (1836).

Genus *MYLOTHRIS*, Hübn.

- M. POPPEA*, Cr. Pap. Ex. ii. pl. 110. f. D (1779).

Genus *BELENOIS*, Hübn.

1. *B. CALYPSO*, Drury, Ill. Ex. Ent. ii. pl. 17. f. 3, 4 (1773).  
Mr. Monteiro obtained a beautiful orange-coloured female of this species.
2. *B. SABINA*, Feld. Reise Nov. Lep. ii. p. 167 (1865).
3. *B. SOLILUCIS*, Butl. Trans. Ent. Soc. 1874, p. 433.

4. *B. THYSA*, Hopffer, Ber. Verh. Ak. Berl. p. 639 (1855).
5. *B. LARIMA*, Boisd. Sp. Gén. i. p. 524 (1836).  
*Pieris capricornus*, Ward, Ent. Mo. Mag. vol. viii. p. 59 (1871),  
is only a variety of the above.
6. *B. SYLVIA*, Fab. Syst. Ent. p. 470 (1775).
7. *B. LOCHALIA*? var., Boisd. Sp. Gén. Lép. i. p. 508 (1832).

Genus *HERPÆNIA*, Butl.

- H. ERIPHIA*, Godt. Enc. Méth. ix. p. 157 (1819).

Genus *ERONIA*, Hübn.

1. *E. ARGIA*, Fabr. Syst. Ent. p. 470 (1775).
2. *E. BUQUETI*, Boisd. Sp. Gén. i. p. 607 (1836).

Genus *IDMAIS*, Boisd.

1. *T. HEWITSONI*, Kirb.  
*T. chrysonome*, Doubl. & Hew. Gen. D. L. t. 7. f. 5 (1847).  
Mr. Monteiro obtained a long series of this insect. I quite agree  
with Mr. Kirby that it is very distinct from *T. chrysonome* of Klug,  
both sexes of which are in my collection from Nubia.
2. *T. DYNAMENE*, Klug, Symb. Phys. t. 6. f. 17, 18 (1829).  
Loanda, Quanza, Ambriz (*J. J. M.*).

3. *T. ERIS*, Klug, Symb. Phys. t. 6. f. 15, 16 (1829).  
The collection contained a pale yellow variety of the female of this  
species.

Genus *CALLOSUME*, Doubl.

1. *C. EVIPPE*, Linn. Mus. Ulr. p. 239 (1764); Clerck, Icones,  
t. 40. f. 5 (1764).  
Ambriz and Loanda (*J. J. M.*).
2. *C. INTERRUPTUS*, Butl. P. Z. S. 1871, p. 724.  
Loanda, August 1872 (*J. J. M.*).
3. *C. HEUGLINI*, Feld. Wien. ent. Mon. iii. p. 272 (1859).  
Ambriz, October 1872 (*J. J. M.*).
4. *C. EPHYIA*, Klug, Symb. Phys. t. 6. f. 9, 10 (1829).

Subfamilia II. *PAPILIONINÆ*, Swains.Genus *PAPILIO*, Linn.

1. *P. POLICENES*, Cram. Pap. Ex. i. t. 37. f. A, B (1776).
2. *P. ANTHEUS*, Cram. *ib.* t. 234. f. B, C.  
One very broken specimen.

3. *P. CORINNEUS*, Bert. Mem. Bologna, 1849, p. 9, t. 1. f. 1-3.
4. *P. LEONIDAS*, Fabr. Ent. Syst. iii. 1, p. 35 (1793).
5. *P. BRASIDAS*, Feld. Verh. zool.-bot. Ges. xiv. p. 307 (1864).
6. *P. RIDLEYANUS*, White, Ann. Nat. Hist. xii. 262 (1843).  
Three specimens only.
7. *P. DEMOLEUS*, Linn. Mus. Ulr. p. 214 (1764).
8. *P. MENESTHEUS*, Drury, Ill. Ex. Ent. ii. t. 9. f. 1, 2 (1773).  
The variety figured by Mr. Trimen in his Rhop. Afr. Austr. p. 320, t. 2. f. 1, seems to take the place of the typical form in South Africa.
9. *P. NIREUS*, Linn. Mus. Ulr. p. 217 (1764).
10. *P. MEROPE*, Cram. Pap. Ex. ii. t. 151. f. A, B (1779).
11. *P. CYPRAEFILA*, Butl. Ent. Mo. Mag. v. p. 60 (1868).
12. *P. CYNORTA*, Fabr. Ent. Syst. iii. 1, p. 37 (1793).
13. *P. HIPPOCOON*, Fabr. Ent. Syst. iii. 1, p. 38 (1793).

#### Familia V. HESPERIDÆ, Leach.

##### Genus ISMENE, Swains.

##### ISMENE LIBEON, n. sp.

Form of *T. ramantek*, Bd. Upperside dark-purplish brown, the inner half of the hind wing clothed with a few pale brown hairs; the fringe at the anal angle almost white. The underside pale brown glossed with purple, with a small indistinct white spot near the anal angle.

Exp.  $1\frac{3}{4}$  in.

Angola.

Type, Mus. Druce.

Mr. Monteiro only obtained a single specimen of this species.

##### Genus CARYSTUS, Hübn.

##### *C. LAUFELLA*, Hew. Ex. Butt. iv. *Hesp.* t. 2. f. 28-30 (1867).

The Angola specimens of this species are much smaller and darker-coloured than those from Old Calabar.

##### Genus PAMPHILA, Fabr.

##### *P. MACKENII*, Trim. Trans. Ent. Soc. 1868, p. 95, t. 6. f. 8.

##### Genus PYRGUS, Hübn.

##### PYRGUS COLOTES, n. sp.

Upperside black; anterior wing clothed with a few grey hairs at the base, three white spots in the cell, and a band of five white spots crossing the middle of the wing from the costal to the middle margin; a submarginal row of very minute white dots; posterior

wing with a white spot close to the base, crossed at the middle by a band of four white spots and a submarginal row of minute white spots; the fringe of both wings alternately black and white. The underside the same as above, except that all the white spots are a little larger.

Exp.  $3\frac{3}{4}$  in.

Angola (*J. J. M.*).

Type, Mus. Druce.

A beautiful little species allied to *P. diomus*, Hopff.

Genus ASTICTOPTERUS, Feld.

A. LEPETETIERII, Latr. Enc. Méth. ix. p. 777 (1823).

Genus CYCLOPIDES, Hübn.

C. METIS, Linn. Mus. Ulr. p. 325 (1764).

Genus PARDALEODES, Butl.

1. *P. sator*, Doubl. & Hew. Gen. D. L. t. 79. f. 4 (1852).

2. *P. laronia*, Hew. Desc. Hesp. p. 35 (1868).

A single specimen of this species was in the collection.

Genus TAGIADES, Hübn.

TAGIADES HEREUS, n. sp.

Upperside, anterior wing dark brown, palish at the anal angle, four minute semitransparent spots on the middle of the costal margin, two below them, and six near the apex; posterior wing yellowish white, the base and the costal margin dark brown, with three brown spots on the hind margin close to the apex. Underside the same as above, except the costal margin of the posterior wing, which is not nearly so brown as above.

Exp.  $1\frac{1}{2}$  in.

Angola.

Type, Mus. Druce.

Mr. Monteiro only obtained a single specimen of this insect; it is quite unlike any other with which I am acquainted.

7. On several rare or little-known Mammals now or lately living in the Society's Collection. By P. L. SCLATER, M.A., Ph.D., F.R.S., Secretary to the Society.

[Received May 12, 1875.]

(Plates XLVII.—LI.)

The difficulty of determining living animals accurately, especially where the species is of rare occurrence or belongs to a genus imperfectly known, must be obvious to every naturalist. I need hardly, therefore, apologize for finding it necessary to make occasional revisions of the terms employed in the lists now printed every month of

the additions made to the Society's Menagerie. On the present occasion I have several such rectifications to offer, and have, moreover, additional remarks to make on certain of the rarer species which now are, or lately have been, exhibited in our Gardens.

## 1. *MACACUS SPECIOSUS*. (Plate XLVII.)

*Macacus speciosus*, G. St.-Hil. et F. Cuv. Hist. Nat. Mam. i. t. 46.

On the 2nd of March last year Capt. Nutsford, of the ship 'Westbury,' brought home for us, from the east, a young female Ape, which was entered in the register at the time as a "St. John's Monkey," and as having been presented by that gentlemen. The Ape, growing more mature, began to show its red face; and upon reexamining it in the autumn, I came to the conclusion that it was a Japanese Ape (*Inuus speciosus* of the 'Fauna Japonica'), and so entered it in the Appendix to the volume of Proceedings for last year\*. This specimen, now nearly adult, is still thriving in the Monkey-house. The fur is generally of a more olive tinge than is given in the figures hitherto published, and the face not perhaps quite so carneous, as will be seen by Mr. Keulemans's drawing.

I also now find that the real donor of the animal is Mr. Abel A. J. Gower, H.B.M. Consul at Hiogo and Osaka in Japan, to whom we are also indebted for a specimen of the rare *Pteromys leucogenys* and other rare animals. Mr. Gower informs me that he obtained this Monkey at Kioto, some thirty miles from Hiogo, where the species is common on the hills†.

According to the 'Revised Catalogue of Vertebrates' (p. 16‡), it will be noticed that we have previously received, in 1864, a Monkey considered to be *Macacus speciosus*. But Dr. Günther has called my attention to the fact that this specimen, which is now in the British Museum, is really an example of *Macacus melanotus*§—a species established by Ogilby, founded on a specimen also formerly living in the Society's Menagerie and now in the British Museum. This Macaque, of which the habitat is still unfortunately unknown, is at once distinguishable from *M. speciosus* by its minutely punctulated fur, whereas that of *M. speciosus* is quite uniform.

## 2. *MACACUS RHESO-SIMILIS*, Sclater, P. Z. S. 1872, p. 495, pl. xxv.

This was a provisional name based by me on a single female specimen brought by Mr. Jamrach from Calcutta in 1872. The individual died on the 9th of the following December; and I exhibit its skin and skull, which I now propose to transfer to the British Museum. The specimen agrees best with the imperfectly known *M.*

\* See P. Z. S. 1874, p. 685.

† Dr. J. J. Rein (Zool. Gart. 1875, p. 55) tells us that this Ape is found all over the island of Nippon up to 41° N. lat., and has consequently a further northern range than any other existing Monkey.

‡ See also P. Z. S. 1864, p. 709.

§ *Papio melanotus*, Ogilby, P. Z. S. 1839, p. 31.

*assamensis*, or at any rate with the specimen which I determined as such (P. Z. S. 1871, p. 222), and which is the type of *M. problematicus*, Gray (Cat. Monkeys, p. 128), and is now in the British Museum. The fur is rather more reddish in tinge, and the tail is rather shorter\*; but I am on the whole of opinion that the two specimens belong to the same species.

### 3. *ATELES MELANOCHIR*. (Plates XLVIII. & XLIX.)

The Black-handed Spider Monkey, as we call it, is now the commonest species of the genus which we receive alive, our correspondents of the West-Indian Mail Service bringing many specimens from the Central-American Ports. They exhibit great variations in colour, as will be seen from the skins now before us, and from the drawings by Mr. Keulemans of four individuals living in the Monkey-house in January last, which I exhibit. They seem to vary between the form designated *A. ornatus* by Dr. Gray, of which I have already given a figure (P. Z. S. 1871, pl. xv.), and the nearly uniformly grey form with black hands and feet, which Dr. Gray (Cat. Monkeys, p. 44) has called *A. albifrons*.

The problem is whether these different forms are confined to different localities, or whether they occur together in the same district. To settle this a large series from different localities in Central America should be examined, which as yet I have had no opportunity of doing. But all the light-grey specimens with black hands and feet (such as that figured Plate XLVIII. fig. 1†) are, so far as I can ascertain, from Nicaragua or Panama; and the dark form (*Ateles ornatus*) alone, as Mr. Salvin tells me, occurs on the Pacific coast of Guatemala. I am inclined to believe, therefore, that we have here to deal with a series of local forms of a "not yet differentiated" species.

### 4. *HAPALE MELANURA*. (Plate L.)

*Iacchus melanurus*, Geoffr. Ann. d. Mus. xix. p. 120 (1812).

*Hapale melanura*, Wagner, Säugeth. i. p. 127 et v. p. 127.

*Mico melanurus*, Gray, Cat. Monkeys, p. 64.

On Nov. 9th of last year we purchased of a dealer a Marmoset in bad condition, which at the time I took for *Hapale argentata* (Linn.), and so entered it in the register. It turns out, however, now that it has got clean and in good trim, to belong to the nearly allied and almost equally rare *H. melanura*, of which we have never previously received a living specimen. Mr. Keulemans's figure (Pl. L.) gives a correct likeness of this peculiar species‡. I likewise exhibit a skin of it obtained by Natterer in October, 1826, at Matogrosso in the interior of Brazil, from my own collection.

\* Long. corp. 18 poll., caudæ 7.

† This and a similar specimen received at the same time (both females) were obtained by the late Mr. Richard Avery Rix, Medical Officer to the Chontales Mining Company at St. Domingo, near Libertad in Nicaragua, in 1873, and were presented to the Society by his father, Mr. S. W. Rix, in July 1874. They are still living in good health in the Society's Monkey-house (P. L. S., July 1st, 1875).

‡ Wagner's figure (Säugeth. v. pl. 13) is not at all good.

5. *CANIS FAMELICUS*, Cretzschmar (?).

*Canis famelicus*, Cretzschm. in Rüpp. Zool. Atl. p. 15, t. 5.

*Fennecus dorsalis*, Gray, List of Carn. p. 207.

On the 11th of June last year we received from Mr. Edwin Sandys Dawes a young Large-eared Fox, or Fennec, which he had obtained from the neighbourhood of Bushire, on the Persian Gulf. The animal unfortunately lost its tail from exposing itself to the attack of an evilly disposed neighbour shortly after its arrival; but with the exception that that organ has been restored from recollection, I believe Mr. Smit's sketch of it, which I now exhibit, is fairly accurate. The determination of this animal is a matter of some difficulty. It appears to be somewhat similar to the specimen presented to us by the Sinai Survey Expedition in 1869, which I determined as *Canis famelicus*\*, only larger. But Rüppell's figure of *Canis famelicus* does not show any black tip to the tail, which our present specimen certainly possessed, and I have much doubt whether it has been correctly referred to that species.

Our Persian-Gulf animal is about two feet long, with long, pointed snout, and large, erect ears. It is generally of a greyish sandy colour, paler below; the upper back darker; the lower back and face rufescent. The ears are black behind; and there is a distinct black patch before each eye. The feet are pale rufous. The tail is stated to have been long and bushy, with a dark streak along its upper surface and terminated by a black tip.

In answer to an inquiry respecting the exact locality and habits of this Fox, Mr. J. L. Oswald, of the same firm, was kind enough to send me the subjoined particulars:—

"In answer to your note to Mr. Dawes relating to the young Persian Fox sent by him to the Society, I am sorry I can give you but little information of the habits of this animal in Persia.

"It was captured within a short distance from the town of Bushire, where they are very numerous. The ground is rocky close to the sea-shore; and the animals retreat into rocky cavities. They are, of course, predatory, and commit depredations in the hen-roosts of adjacent villages. The natives do not hunt near the sea-coast; but in the interior sport is very common. The Foxes are easily captured with the aid of dogs; and Europeans resident in the neighbourhood of Bushire frequently amuse themselves in the evening ferreting out these animals, which often take to the sea, seeking safety from the dogs. I conclude they are herbivorous, but often felt curious to ascertain their mode of subsistence.

"Should you wish for another specimen, I shall be happy to be the means of obtaining it."

Mr. Dawes and his friend promise me to obtain some more specimens of this interesting animal, which will, I trust, serve to enable me to distinguish the species accurately.

Meanwhile it is as well to record the existence of a Fox of this form on the Persian Gulf.

\* See P. Z. S. 1869, p. 149, et Rev. Cat. Vert. p. 49.



6. *PROCYON CANCRIVORUS*.

*Ursus cancrivorus*, Cuv. Tabl. El. d'H. N. des Anim. p. 113 (1798).

*Procyon cancrivorus*, Wagner, Säugeth. ii. p. 160.

Of this southern form of *Procyon* we have certainly two very distinct kinds now living in the Gardens, which we call the Red-footed and Black-footed Crab-eating Raccoons. Of the former we have an adult male, being one of the two purchased of Dr. Ridpath, October 1, 1870, and stated to have been obtained at Colon, and a pair of young ones lately presented by Mr. J. R. H. Wilton, by whom they were brought from Demerara. Of the latter we have an adult male purchased of Mr. J. Simon in May, 1870, and *probably* from S.E. Brazil.

On comparing these animals together, it will be at once remarked that the red-footed animal is easily recognizable by its pale reddish feet, which are almost denuded of hairs, and its yellow body underneath. In the black-footed form the feet are more hairy and are of the same grey colour as the legs, and the body beneath shows no tinge of yellowish, although paler than the back. The paws and claws are black or nearly so, and the ears are much darker.

I exhibit a skin of the red-footed animal, being that of the second male, received in October, 1870. Of this form we have also had another individual, brought by Mr. A. M. Sandbach from British Guiana in June 1872. All other examples of this animal previously in the Gardens have belonged, I believe, to the black-footed form.

Upon these facts I come to the conclusion that there are two forms of *Procyon* met with in South America—the red-footed, from Guiana and Columbia, up to Colon, and the black-footed, *probably* from S.E. Brazil and Paraguay. As Cuvier's *Ursus cancrivorus* is founded on the animal of Cayenne, the northern red-footed animal must retain the original specific term, and the southern black-footed form will probably require a new name.

7. *CERVULUS MICRURUS*, sp. nov. (Plate LI. fig. 1.)

The series of Muntjacs (*Cervulus*) in the Society's Collection has been largely augmented during the past year; and we have now living in the Gardens no less than 12 specimens of the different forms of this animal. I will say a few words on each of the species, taking them in the order given by Sir Victor Brooke in his excellent article on this genus\*.

(1) *Cervulus muntjac*—Of this species we have a male obtained from the Jardin d'Acclimation in November last, and a pair purchased in March last. It will be observed on comparison, how much larger and brighter in colour the Burmese male (from Saigon) is than the male of the pair subsequently purchased, which probably represent the ordinary Indian form of this species.

This leads me to believe that Sir Victor Brooke's suspicions as to the specific distinctness of the Indian and Burmese forms are very likely to turn out to be correct.

\* P. Z. S. 1874, p. 33 *et seqq.*

(2) *Cervulus sclateri*.—Of this large Chinese species we have two males, both purchased of Mr. Edward Bartlett in May, 1874. These animals were sent to Mr. Bartlett from Ningpo by Mr. A. Michie.

(3) *Cervulus reevesi*.—Of this smaller Chinese form we have a male purchased of Mr. L. Fraser in 1867, which was originally obtained in Formosa by Mr. Swinhoe, and a female presented by Mr. A. Michie in September, 1873, which that gentleman assures me came from Ningpo.

The pair bred in the Gardens last year; and a young one was born July 13, which is now consequently about a year old. They bred again this year; and a young one was born on May 27th, of which I exhibit a sketch by Mr. Smit (Plate LI. fig. 2) taken on June the 6th, when the animal was about ten days old. This drawing shows that the young *C. reevesi* is spotted, a point hitherto undecided.

More recently we have received a young pair of this species from Formosa, presented by W. P. Galton, Esq. (Nov. 17, 1874); so that we have now 5 specimens of it.

(4) *Cervulus micrurus*, sp. nov.—Under this name, as a temporary designation at all events, I am compelled to separate two Muntjacs, both received from China last year and purchased of Mr. E. Bartlett. The female (received Feb. 27) was sent from Ningpo by Mr. Michie; and the male (received May 29) was, as that gentleman informs me, transmitted by him from Hong-Kong. But he believes that this individual or its parents came originally from Formosa.

This Muntjac is of nearly the same size as Reeves's Muntjac, and generally resembles that species, except as regards its very short and almost rudimentary tail. At first I suspected this appendage might have been clipped; but, so far as we can tell from examining the living specimens, this is not the case; and Mr. Michie is likewise of opinion that the present state of the tail is natural. There are likewise several minor differences which distinguish these animals from *Cervulus reevesi*, such as the slightly smaller stature and white rings round the feet. But I am far from considering the species satisfactorily established until an anatomical examination of the specimens has been made.

#### EXPLANATION OF THE PLATES.

##### PLATE XLVII.

Young female of *Macacus speciosus*, presented by Mr. Abel A. J. Gower.

##### PLATE XLVIII.

Fig. 1. Light-grey variety of *Atles melanochir*, from one of two female specimens from Nicaragua, presented by Mr. S. Wilton Rix, July 31, 1874. (*A. albifrons*, Gray?)

2. Rather darker variety of ditto, from a specimen purchased October 18, 1874.

##### PLATE XLIX.

Fig. 1. Still darker variety of *A. melanochir*, from a specimen presented by Mr. H. Campbell, January 4, 1875.

2. Dark variety, with rufous front and belly (approaching to *A. ornatus* of Gray), from one of two male specimens deposited by Mr. H. B. Whitmarsh, August 14, 1873.

## PLATE L.

*Hapale melanura* ♂, from a specimen purchased November 9, 1874.

## PLATE LI.

Fig. 1. *Cervulus micrurus* ♂, from the specimen received May 29, 1875.

2. Young female of *Cervulus reevesi*, born in the Gardens May 27, 1875, from a sketch taken by Mr. Smit, June 4th. [P.S. On June 28th the spots were nearly obsolete.]

## 8. Notes on Fijian Birds. By EDGAR L. LAYARD, F.Z.S.\*

[Received May 18, 1875.]

The following notes on the birds of Fiji are offered to the Society, not as contributing any thing very new, but as the result of one year's residence in the group. Continued and harassing official duties, in the difficult and trying position in which I have been placed, have prevented me from doing more than to devote a moment here and there to ornithology as a relief to the mental strain on me. No one but he who has experienced it can appreciate the relief to turn from official squabbles and the pettinesses, heartburnings, and jealousies of a small community to the tranquil study of Nature. Small and infrequent have been my chances here; and I am indebted to one of my servants for the majority of the specimens I have obtained, and for much of the information I have acquired.

My visits round the islands have always been official, and performed in a man-of-war, the routine of which prevents collecting to any extent. Moreover I find that age is creeping on me, and I cannot now scale the hills as I used to do without fatigue; and on Ovalau we have nothing but hills, among which dwell the only birds really worth seeking. The whole country, however, is singularly destitute of birds. My butler, who was very active, would start before daylight, so as to reach the summit of the island by the earliest dawn, and then descend about eleven or twelve o'clock. He never brought down more than *ten birds* on any occasion, and assured me he shot all he could. Pigeons may be heard all round, but they are very difficult to see; they are the commonest of all our birds. I have gone up once or twice, and sat at the foot of a tree in full flower or fruit; and in an hour perhaps two or three birds would come to it, chiefly *Zosterops*!

Our seaboard is the same. As I write I look over a waste of waters unbroken by the white wings of the lovely and graceful Terns or snowy Gulls of the Cape, or India, or Europe. No strings of black Cormorants break the brilliant green of the circling reef; the shrill call of the Curlew and the pipe of the Plover are sounds unknown on our shores!

One would have thought that

"Amid the green islands of glittering seas"

\* [See, for previous papers on this subject, "Ornithological Notes from Fiji, with Descriptions of supposed new Species of Birds" (P.Z.S. 1875, p. 27), and "Descriptions of some supposed new Species of Birds from the Fiji Islands" (P. Z. S. 1875, p. 149).—ED.]

myriads of seafowl would find a congenial home; such, however, is not the case here, and I have never yet resided on a coast so utterly desolate.

The avifauna, as given by Finsch and Hartlaub in their 'Ornithologie der Viti-, Samoa- und Tonga-Inseln,' comprises sixty species found in the Fijis. I have added several to this list, and *Lamprolia victoriae* and *Chrysæna victor* must be included. I suppose seventy species may be set down as the number inhabiting an area of 7400 square miles, but scattered over a space *five times* as large as Wales! Compare it with the island of Jamaica, which has an area of 6490 square miles in one block, and its known species amount to at least 220.

It is probable that a few new species may turn up, now that the mountainous interior will be opened to travellers. Taviuni also has not been well worked; nor have some of the small islands, such as Moala and Totoya to the south-west; but I do not expect much from these latter; they are too small.

*ASTUR CRUENTUS*, Gould; F. & H. *op. cit.* p. 3.

This Hawk is not uncommon, and widely distributed throughout the islands. It feeds chiefly on Lizards and *Mantidæ*, but will not disdain a bird occasionally. Finding that the young of our domestic poultry are easy of capture, it often makes raids on the planters' homesteads, till vengeance overtakes it in the shape of a charge of shot. It builds in large trees, making a coarse nest of twigs, and lays two to four eggs, axis 1" 9", diam. 1" 5", of a dirty white colour, more or less clouded, blotched, or spotted with dark dry blood-coloured marks. They vary considerably, some being only clouded, others generally spotted, others spotted in a ring round the major diameter; some are almost pure white, with very tiny freckles of colour sparsely distributed. They seem to breed over several months; or else the same pair have two broods. Fresh eggs have been brought to me in February and May, and hard-set ones in the same months. I have reared nestlings from the downy stage by feeding them on raw meat; they uttered a shrill stridulous cry, similar to that of the adult birds, but not so loud. Iris, legs, and cere of the bill in the adult a fine bright orange; tip of bill and claws bluish. In the young the iris is brown.

*CIRCUS ASSIMILIS*, Jard. et Selb.; F. & H. *op. cit.* p. 7.

Frequents open grassy lands and swamps, and, I am told, mostly feeds on grasshoppers and such like, though it will occasionally carry off a young chicken. I have seen it abundantly at Suva, Naudi, and Ba-river district; also on the sugar-plantations on the Kewa, on Wakaia, and very sparingly on Ovalau. Beats its ground like the English Harriers.

*STRIX DELICATULA*, Gould; F. & H. *op. cit.* p. 11.

Not often seen, but, I am told, widely distributed. A single specimen in my possession was sent me from the Kewa, on which river

my son saw it hunting over grassy land, like the English Barn-Owl. I also have it from Ovalau.

*PLATYCERCUS TABUENSIS* (Gmel.); F. & H. *op. cit.* p. 17.

Non vidi.

*PLATYCERCUS SPLENDENS*, Peale; F. & H. *op. cit.* p. 20.

Common on Viti Levu, Vanua Levu, Kandavu; none on Soma, Loma, Mango, Thithia\*, Munia, Naitamba, Ovalau, Wakaia, and Mokuai. I am inclined to think the Taviuni bird is either distinct or a local variety. It has more *brown* in its colour, some that I have seen being almost of a chocolate-crimson. Breeds in holes of trees, and lays two eggs, white, or so much stained as to appear reddish. I am not sure how this stain arises, whether from the parent bird or the bark with which the nest is lined. It occurs also in eggs of *P. personatus* to such an extent that I mistook some eggs sent me for those of *Astur cruentus*, until assured by my correspondent that he had only taken those of the Parrot. Axis 1" 5"', diam. 1" 2"'. They are very noisy in their flight, and generally ramble about in small companies from five to ten in number, feeding on wild fruits and berries; in some places they do much harm to the fields of maize and sugar-cane. The natives account for the want of Parrots on Ovalau, Wakaia, and Mokuai, by a tradition that a god in the shape of a large serpent dwelt on the latter island, and wandered about, serpent-fashion, during the night. Of course he slept during the day, and his early morning slumbers were disturbed by the cries of the "early birds" among the Parrots; he therefore issued an edict that they were all to die off these islands; and die they did! He exempted the "Kulas" (*Lorius solitarius*, Lath.) from the ban, as their voices are not so loud; and therefore "here they dwell unto this day." The native name of both is "Kau-kau," or "Kaka," and on the Kewa "Ka-Ndamu," according to Mr. Storck.

*PLATYCERCUS PERSONATUS*, G. R. Gray; F. & H. *op. cit.* p. 21.

The same remarks as to distribution may be made with this species as with the last, except that since the annexation of these islands my butler, who has been collecting for me in the upper ranges of this island (Ovalau), tells me he has several times seen a small party of these birds, evidently "quite at home." Perhaps they are aware that the old days have passed away, and that under the British flag "liberty" and "equality" flourish; and so they have determined to set their old enemy the serpent at defiance, and come to reinhabit the homes of their ancestors. It will be interesting to note if the little new colony flourishes.

\* I spell the names of these places as they are pronounced, and not in the absurd fashion introduced by the missionaries when reducing the language to writing. According to it, every D and G has an N before it, more or less sounded; and Th is represented by C. Thus, Mang-o (the g belonging to the first syllable) is written Mago, and Thithia = Cicia. All the vowels in Fijian have the Italian sound: k stands for the hard c, as in "eat."

This species is characterized by possessing a musky smell, resembling that of a he goat. I supposed it originated from the trees in the holes of which they breed; but having obtained some very young birds, I noticed they did not smell. Since, however, that they have attained their full plumage the odious scent has come to them. They are easily reared, become very tame, and may be trusted with their liberty, foraging for themselves in the forest, and returning to roost to their old nursery. A young lady of my acquaintance has two which thus fly at liberty; and my own birds keep to the house, and never dream of flying away. In certain lights their plumage is shot with a beautiful golden sheen, which becomes dim in a dead specimen. The iris changes from brown in the nestling to a brick-red with a dash of orange in it in the adult; the bill is dark horn-colour, with a whitish tip; the feet livid black. In habits they resemble the former species, and keep to the same description of country, forest and wooded river-banks. Breed in holes of trees, and lay two eggs; axis 1" 6", diam. 1" 3". Called "Vanga" at Bua (*Holmes*).

The nestling of this Parrot is green above, feathers here and there tipped with white down; black on the face scarcely showing. Body covered with black down, with a row of bright yellow feathers changing into orange on the belly and vent on each side; outside the yellow cere a few green feathers appearing. Bill horn-colour, with the edges, tips, and bases of mandibles orange. Thighs nearly naked. Tarsi livid. Iris brown.

*LORIUS SOLITARIUS* (Lath.); F. & H. *op. cit.* p. 23.

This lovely little bird, called "Kula" by the natives (and *solitarius* by Latham, "*because it is never seen alone*"), is found throughout the islands, its favourite food being the flowers of the *Erythrina* when in bloom, or those of the cocoa-nut when others fail. The collector, if he wants these little beauties, need only seek some tree in flower on which they feed, and sooner or later every flock in the district will visit it. I have heard of sixteen being killed off one tree in a morning's shooting. They are trapped in great numbers by the natives for sale to the Tongans and Samoans, who periodically pluck them, their crimson feathers being much used for ornamentation. Europeans find much difficulty in keeping them alive, even for a short period; but I am told the native girls chew sugar-cane and berries, and allow the birds to feed from their lips.

*CUCULUS SIMUS*, Peale; F. & H. *op. cit.* p. 28.

This rare Cuckoo was obtained (a single specimen) by the 'Challenger' Expedition at Kandavu early in August; two individuals were killed on Taviuni by Mr. Liardet in November; and Mr. Storck procured for me a pair consisting of a young male and a female in January 1875. He says they frequent the darkest, densest portion of the forest, and only betray their whereabouts by their whistling notes.

CUCULUS INFUSCATUS, Hartl. ; F. & H. *op. cit.* p. 31.

A single specimen of this sombre-coloured Cuckoo was shot on "Brewer's Rock," a large mass of pudding-stone at the back of my residence, in the month of February. Mr. Kleinsmidt captured a specimen in his garden in January.

Both these Cuckoos are migratory, arriving in these islands at the end of the year. They are considered very rare ; but I suspect this is owing to their retiring habits, and their frequenting the depth of the forest.

EUDYNAMIS TAITIENSIS (Spartm.).

Non vidi.

CHALCITES, sp. inc.

Mr. Henry Thurston, a gentleman who has devoted some attention to birds both in Australia and Fiji, assures me that he has shot the little "Bronze Cuckoo" of Australia on Taviuni. He knows the species well, having skinned many of them.

HALCYON SACRA (Gmel.) ; F. & H. *op. cit.* p. 32.

This Kingfisher is one of the commonest birds in Fiji, being found along the whole seaboard, and inland up the rivers. It feeds on crabs, fish, lizards, locusts ; in fact, few living things that can go down its throat are rejected. It perches equally on the stones left bare by the retreating tide, and on the topmost branches of the tallest forest-trees. I have often, when in the latter situation, mistaken its cries for those of *Astur cruentus* on the wing. The natives call it "Sé-sé," and declare that it builds in ants' nests on the trees, laying four to six eggs (pure white, axis 1" 1"', diam. 1"), chiefly in November and December. The white ants of this country construct nests in hollow trees ; and it is in these scooped out that these birds are said to breed. Kleinsmidt says in Ovalau it is called "N'lé-sé."

HALCYON CASSINI, F. & H. *op. cit.* p. 40.

I obtained a single specimen of this Kinghunter on the Waimanu branch of the Rewa. It was on a tree in the forest at the back of Mr. Thomas's plantation.

CAPRIMULGUS, sp. inc.

I have been assured by the natives on Koro that a bird exists on their island "which has the power in the evening of turning itself into a stone, and lying in the footpath till you almost tread upon it, when it flies up into your face. It has large eyes and a huge mouth, for the purpose of catching the rats on which it feeds." Divest this of the miraculous and the misconception as to the use of the "huge mouth," and you clearly have a Goatsucker indicated. I asked if they knew the Owl. "Yes ; they knew that bird, but it was not that."

COLLOCALIA SPODIOPYGIA (Peale); F. & H. *op. cit.* p. 48.

This little brown Swift is about the commonest bird throughout the islands, frequenting equally the seaboard and the whole of the inland country. Wherever I have been I have seen it whirling about in pursuit of the tiny insects on which it feeds. It rarely comes within gun-shot, except towards the evening; and then in the uncertain light it often dashes past singly, never in flocks. I never heard it utter a sound.

My son Mr. L. Layard, while on a collecting-trip to the windward islands of this group, heard of several caves in the limestone that prevails there, in which these birds were reported to breed. He writes as follows:—

“Before I left England for Fiji in September 1873, I had heard a rumour that the edible-nest-building Swift was found in a cave on one of the islands, and determined to verify the truth if ever I had the chance. In November last I made a trip to the ‘Windward Islands,’ for the purpose of obtaining some specimens, and to see if the country was suitable for the growth of sugar-cane, which a good many of our unfortunate planters are trying, now that the cotton market has failed them. While at Loma Loma, Mr. Hennings asked me to visit a small island of his, named ‘Katafango,’ on the extreme outer edge of the Fiji group; where, he said, was a large cave, inhabited by a number of ‘small Swallows,’ and he was anxious to know whether the nests were the edible ones or not. Of course I was eager to start at once; but as no vessel was going that way just then, I went to another island named Cicia, where a second ‘Swallows’ cave’ was reported to be.

“I found this cave in the face of a great ridge of limestone cliffs, which formed a sea-wall several miles in length on the estate of Mr. Lennox. There were two entrances to this cave, the one on the ground-level being a deep groove parallel with the sea-shore, and terminating in an immense dome-shaped chamber, tenanted by the birds I was in search of. This chamber was almost circular, about 90 feet high and 120 feet across—with a small round hole, about 6 feet in diameter, halfway towards the roof, looking to the sea, which was the only entrance used by the Swifts, but inaccessible to man. There were a great number of birds flying about the roof, and in and out of their entrance. They kept up a continual low twittering note, such as I had never heard before; and I noticed that they did not venture more than a few yards beyond the mouth of the cave. The ground was thickly covered with guano, like fine black flour, the depth showing that the birds must have frequented the place for a long period. Not having a gun, I could not obtain any specimens; neither could I get any nests, though I fancied I could dimly discern some on the roof by the light of the old cocoa-nut-leaf torches we carried. I saw the birds were new to me, and asked Mr. Lennox to shoot some, and send them to us in spirits at his earliest convenience.

“In the middle of December I visited an island named Mango, the property of Messrs. Ryder brothers, and within sight of Cicia. This



island is an enormous mass of crystallized limestone, and has also a cave in which the Swifts breed. Like Ciccia, this cave is in the limestone cliffs running parallel to the sea. In the face of these cliffs is a small ravine, just a series of sharp-pointed blocks of stone, and a tangled mass of immense 'lianes' and monkey-ropes. Up this place, in company with Mr. T. Ryder, I had to make my way, and almost cut a new pair of shoes to pieces doing so. The mouth of the cave is about 100 yards up this ravine. It is small, not more than 10 yards in diameter, but opens at once into an immense hall, exactly like a theatre. On either side are the galleries, with pillars, composed of stalactites extending from roof to floor. Below is the pit, and opposite the entrance a level platform for the stage. The setting sun shone in at the entrance, and filled the whole place with a beautiful bright green light reflected from the limestone walls around. This place had evidently been used as a fortification during the troublous times of ancient Fijian history, as the mouth of the cave had been considerably lessened in width by carefully piled up walls of stones. Indeed ten years ago, a little after Mr. Ryder took possession of the island, and before he was aware of this cavern, a band of predatory Fijians from another island, whom he was pursuing, escaped him by taking refuge in it. One of them afterwards told him that as he and his men passed down the ravine, they lay behind the stone wall, with their muskets cocked and pointed. But to return to my subject. Descending from the galleries, we crossed the pit, ascended the stage, and passed into a low and narrow passage, along which it was frequently necessary to go on all fours. The twittering of the Swifts, roused by our torches, now became audible, as they dashed past us; and the ground was covered deep with guano. Occasionally, too, a gaping black cleft would appear across our road, compelling us to travel very circumspectly. After about 40 yards of this work, the passage suddenly opened into a second immense circular hall, with stalactites hanging in every direction. This was evidently the main home of the Swifts; and I could see their nests all about, with the birds sitting on them apparently dazzled by the light. It was the height of the breeding-season, and from most of the nests two little bare heads and necks were hanging out, completely bewildered by their first sight of light. Balancing myself on one foot on the sharp point of a stalagmite, and supporting myself with one hand against the cavern-side, I managed to secure my first nest. Below me, over which I reached, was a black chasm, very narrow but very deep, and which I did not care to look into too particularly. Taking the bird off, to my great delight I found two glistening snow-white eggs. The bird, a female, I then killed. By some alpine scrambling about damp and precipitous ledges, we got into several little chambers close by the roof of the big hall, which contained numbers of nests. In only one more nest, however, did I find any eggs; every one contained two callow young. If I had arrived a fortnight before, I should have made a great haul. The nests were composed of the long stringy leaves of the iron-wood tree (*Casuarina*) gummed together, and fastened to any slight pro-

jection of rock. One nest only did we find in which the leaves, after completing the circle, had been allowed to hang from the front, forming a complete 'beard.' The nests of these Swifts at one place must have been fully 150 yards underground. Mr. Ryder assured me he had penetrated for another 100 yards, till he dared not go any further, as he arrived at a shelf with a very steep incline downwards to an unknown depth; the Swifts were still nesting as far as he went. I was too much occupied in skinning doves to make another visit to the cave; but I believe that these Swifts are *night-flying birds*, as I never saw any outside the caves until we disturbed them, and then they never ventured further than a couple of yards from the entrance. Mr. Hennings told me also that a bird he caught in the Katafango cave, when let loose in the house, kept flying against the furniture, as if blind. The neighbouring planters, too, say that they never saw the bird anywhere except in the caves.

"I did not visit Katafango, as I had found the same bird on two islands, and I did not consider it likely there would be another species on an island within sight of the other two. Moreover I had had enough of Fiji 'ten-ton cutters'! There were also some very small bats in the cave. On Mango Island I procured specimens of *Carpophaga latrans* and *C. pacifica*, *Columba vitiensis*, *Ptilinopus perousei*, and *P. fasciatus*."

Mr. L. Layard's notion of their being "night-flying" birds is, of course, erroneous to a certain extent, as I see them every day flying in the sunshine; but what instinct guides them to their nests in the dense darkness of the vast underground caverns in which they breed?

Mr. L. Layard brought two nests, composed entirely of the thread-like leaves of the *Casuarina* agglutinated together; diam. 2" 3", depth 1". They have evidently been glued on to shelving rocks, and in one the long filaments have only been fastened at one end, the other hanging down some 8 or 10 inches, like a "beard." The eggs are pure white, of an obtuse oval; axis 8", diam. 6".

*COLLOCALIA VANICORENSIS* (Quoy et Gaim.); F. & H. *op. cit.* p. 47.

Non vidi.

*HIRUNDO TAHITICA* (Gmel.); F. & H. *op. cit.* p. 51.

This Swallow is very local, but, I think, widely spread throughout the islands. It is said to nest in rocks; and I feel confident a pair nested this year in the cracks and crannies of "Brewer's Rock," as they were visible almost every evening during my residence in my present house, flitting over the little point of land on the other side of the creek, and in front of my veranda. They are very crepuscular in their habits. I saw them in the hills as far up the Rewa river as Naruku-ruka, mingled with the Swifts also at Kandavu, Loma Loma, and Taviuni.

Bill black; legs black. Iris dark brown. Feed on minute insects.

*ZOSTEROPS FLAVICEPS*, Peale; F. & H. *op. cit.* p. 52.

This little "White-eye," called "Gingi" by the natives, is gene-

rally distributed. It nests in low bushes; and many of its "procreant cradles" have been brought to me, but never any thing like that wonderful structure figured by Finsch and Hartlaub in their 'Ornithologie.' That must be quite abnormal, I should fancy. All I have seen resemble those of the species inhabiting Ceylon and the Cape of Good Hope, being composed of moss, fine fibres, cobweb, &c., and lined with the fine black rootlets of some plant. They are usually placed in the upright fork of two or more twigs, and vary in depth outside according to the angle of its supports. The eggs, three to four, are turquoise blue; axis 8", diam. 6". In habits it resembles the "White-eyes" of other countries. Mr. Storck writes, "very destructive to imported as well as native fruit." Bill and legs very pale livid brown; lower mandible almost white. Iris pale grey brown.

ZOSTEROPS EXPLORATOR, Layard, P. Z. S. 1875, p. 29.

Resembles *Z. flaviceps*, but is yellow, not grey, on the chest.

One specimen only was obtained; and before I could obtain a detailed description of it, it was packed away for transmission to Europe.

Kandavu (*H.M.S. 'Challenger'*).

MYZOMELA JUGULARIS, Peale; F. & H. *op. cit.* p. 54.

This little bird replaces in these islands the *Nectarinia* of India. Any person conversant with the one would, on first seeing and hearing these birds, fancy he had before him some of his old friends. They abound about the cocoanut-trees, eagerly searching their flowers for minute insects; they are also found in the forest region, at the greatest altitude that I have been. Like their prototypes, they are very quarrelsome, chasing each other with shrill cries, darting and turning about among the foliage, often grappling in the air, and falling a considerable distance before they disengage from their struggle. Young birds want the red on the head and rump. The natives call them "Dreui-n'dela-kiela." Bill black; legs dark livid; soles of feet yellow; iris grey brown. ♂, full breeding, 1.175 inch. Native name "Keri-keri-sai."

MYZOMELA NIGRIVENTRIS, Peale; F. & H. *op. cit.* p. 56.

Non vidi.

PTILOTI PROCERIOR, F. & H. *op. cit.* p. 62.

Common on some of the islands, viz. the north of Viti Levu, Ovalau, and Waikaia; on Kandavu mingled with the next species, sparingly; on Loma Loma replaced, as far as I yet know, by what I take to be *Ptilotis carunculata*, or a new species. In common with the others it has a loud clear ringing whistle, which is chiefly heard in the early morning or the afternoon. It is very partial to the cocoanut-trees, hunting for insects amid the flower-sheaths; but it is also found on the Iri trees and others, though not commonly in the forest proper.

Nests composed of coarse rootlets slightly woven, so that the eggs may be seen through against the light, and lined with finer rootlets, and even the hair of animals; generally placed in the fork of a branch. Diam. 3", depth 2". Eggs three to four, axis 1", diam. 9", delicate pink (fades rapidly), speckled, chiefly on the obtuse end, with dark pink spots. It breeds in October, November, and December, in each of which months eggs have been brought to me\*.

Bill black; legs dirty green; inside of feet yellow; iris dark brown. Male considerably larger than female: in full breeding-story 1 to 1.75 inch.

*PTILOTIS CARUNCULATA* (Gmel.); F. & H. *op. cit.* p. 58.

This *Ptilotis* is, as far as I yet know, confined to Loma Loma, where my son shot it in the middle of December, showing no signs of breeding. He was for some time on Mango and Thithia, and neither saw nor heard it; neither did I in my flying visit in the early part of the year, though I heard a species on Loma Loma, and indeed in most of the other places at which we touched; but my time was too limited, and otherwise engaged, to enable me to collect any thing. My son found it frequenting the flowers of the "Ndilo" trees, extracting minute insects.

*PTILOTIS PROVOCATOR*, Layard, P. Z. S. 1873, p. 28.

This new species seems confined to the island of Kandavu, the southernmost of the group.

In habits, call, &c. it resembles *P. procerior*. I found it frequenting the *Erythrina* trees, in flower during my visit there, hanging about the blossoms in every conceivable position for the purpose of probing the flower-tubes in search of honey and insects.

*TATARE? VIRIDIS*, Layard, sp. nov.

General colour throughout a uniform olive-green, tinged with yellow. Inner webs of primaries very dark green; outer webs golden green; shafts of wing- and tail-feathers black. Underside of wing pale buff; plumage somewhat lax; bill and legs bright orange; bill 1" 10", much curved. Tarsi 1" 6"; legs strong, largely scutellated in front, none behind; claws dark, hook-curved, and sharp. Total length 10"; wing, 5" 2". Tail-feathers pointed. First quill of wing half length of third; second quill much shorter than third, which is shorter than fourth; fourth, fifth, sixth equal; seventh and eighth graduated. Tail 5".

Found at Tavuni by Mr. Liardet. Said to "creep" on trees. I know nothing of it personally.

*LAMPROLIA VICTORIÆ*, Finsch, P. Z. S. 1873, p. 735, pl. lxii.

This singular bird is confined to a mountain-range on the north of Tavuni. Mr. Liardet, in a late expedition, procured several specimens. From his description of its habits I should be inclined to

\* Mr. Kleinsmidt had a nest of young ones in his garden, fully fledged in the first week in February.

place it near the "Chats" (*Saxicolinae*), the curious white upper half of the tail helping me to this idea. Mr. Liardet says the natives call it "Wali-na-koli," which means "the dog cannot catch it," in allusion to its habit of running on the ground, and, when pursued by the dog, flying up just out of reach. It is only known to the natives in its immediate vicinity.

*MYIOLESTES VITIENSIS*, Hartl.; F. & H. *op. cit.* p. 71.

This bird frequents the forest, never coming near the haunts of men. It ranges high up in the mountains, being found about the summit of Ovalau (2000 feet). It feeds on insects, which it tears to pieces, like a Shrike (not, however, spiking them). Iris brown; bill black; base of commissure yellow; legs blue.

*MYIOLESTES MACRORHYNCHA*, Layard.

This bird was shot on Taviuni by Mr. Liardet. I know nothing of its habits, except that it frequents the forest, and feeds on insects.

*PACHYCEPHALA GRAEFFEI*, Hartl.; F. & H. *op. cit.* p. 72.

If I am right in the identification of these birds, the species inhabits the forest in high mountain-ranges. It is oftener seen than shot, being of a most restless disposition, ever on the move, and never remaining quiet on a branch for a moment. It feeds on insects, darting at them on the branches, leaves, or in motion with equal success.

*PACHYCEPHALA VITIENSIS*, G. R. Gray; F. & H. *op. cit.* p. 73.

A single specimen (♀) of this bird only, obtained near the summit of the mountains on Ovalau.

*PACHYCEPHALA TORQUATA*, Layard, n. s.

Upper part back, wings, and tail very dark, almost black, shaded with dark olive-green on the outer edges of all the wing-feathers and back, the tips of the tail-feathers being pale. Head above black. All the underparts of the body bright orange; the gorget crossed by a broadish crescent-shaped black collar. At back of the neck (nape) an indistinct orange collar (*specimen badly preserved*). Undersides of wings and tail lighter than above; the inner edges of the secondaries buff; tip of tail much paler. Length circa 7"; wing 3" 10"; tail 3"; tarsi 1"; bill 1 1/2". Bill black; legs horn-colour.

Taviuni. Liardet (♀ red brown, paler below). "Kulu-oso" of the natives. A bird answering to this description pretty well was shot by Pearce on Ovalau, December 28th, 1874. Iris dark brown; bill black; legs brown. Length 6" 6"; wing 3" 10"; tail 3"; tarsi 1"; bill 1 1/2". Pearce's specimen, however, is not so yellow, nor is the collar so broad; the colour of the back also differs.

*LALAGE TERAT* (Bodd.); F. & H. *op. cit.* p. 80.

The bird that I take to be this species I have only found in the state described by Drs. Finsch and Hartlaub as being immature.

Nevertheless, I have procured it all the year round, and from all parts of the group. It is called by the natives "Manu-sa." It frequents the Iri and Ndilo trees near the beach, and low scrub or high trees in the forest. Upper mandible bluish black; lower pale yellow with dark tip; legs bluish; iris dark brown. The natives declare it assumes no other phase of plumage; and I have certainly killed it all the year round, and found it with largely developed testes, but never saw any other.

ARTAMUS MENTALIS, Jard.; F. & H. *op. cit.* p. 84.

This "Wood-Swallow" is so eminently like a Martin (*Hirundo urbica*) in its appearance and manner of flight that, in my first acquaintance with it on the wing, I shot it under the full impression that it was a Hirundine. Great was my astonishment, therefore, to pick up a "Wood-Swallow." It is very local, a pair frequenting a favourite tree, and suffering no rivals near their throne. Even their young ones are driven off after a certain time. A pair at the Dépôt at Thawathi attacked a Cockatoo from the Solomon Islands (that flew at large about the house) in a cocoanut-tree, near which they built, and pecked out his eyes. I have been credibly informed they will attack and kill small half-grown fowls. The natives call it "Ndree," and on the Rewa "Vutiasé."

RHIPIDURA ALBOGULARIS, Layard, P. Z. S. 1875, p. 29.

♀. Upper parts above very dark black brown, tinged with a warm reddish brown on the rump and back; eyebrow, chin, and throat white; underparts greyish, more or less longitudinally striped with black and white, and tinged on the belly and vent with isabella colour. Primaries dark brown; secondaries faintly edged with reddish brown; tertiaries and coverts edged and tipped with the same. Tail-feathers dark brown, all but the four central broadly tipped with white. Bill black; lower mandible white at the base, with dark tip; bristles of bill black, and exceeding it in length. Legs blackish brown. Iris brown. Length 6"; wing 3"; tail 3" 6"; tarsus 10"; bill 6".

This pretty little "Fantail" Flycatcher is found in the forest that clothes the island of Ovalau; elsewhere I have not seen it. It generally hunts in little families of three or four individuals, and darts at insects at rest on the leaves or twigs. I fancy also I have seen them dart upon and capture insects on the wing, when near them on the bush; but their actions are very quick, and I am not sure of it. They frequently elevate and spread their tails, and are pugnacious little fellows, fighting fiercely with their companions.

MONARCHA LESSONI (Homb. & Jacq.); F. & H. *op. cit.* p. 88.

This little bird, clothed in quiet grey, like a demure Quaker girl, is an active bustling little body, roaming about in flocks, busily scouring branches and leaves for its favourite food, small insects. I found it commonest at Ngaloa Bay (Kandavu), but came across it in almost every other part of the colony. Iris brown; bill and legs blue.

MYIAGRA CASTANEIVENTRIS (J. Verreaux); F. & H. *op. cit.* p. 95.

This Flycatcher is common throughout the islands; and its shrill note may be heard in every situation. Nests said to belong to this bird have been brought me from many localities; they precisely resemble that figured by Drs. Finsch and Hartlaub as the nest of *Ptilotis carunculata*, being beautiful compact cup-like structures made of fibres and rootlets (horsehair and cowhair being even used in some localities for lining), and covered outside with pieces of lichen most beautifully stuck in, so as to resemble a knot on a branch. They are generally placed on a drooping branch, or in a fork, and are about 2 inches in diameter, and  $1\frac{1}{2}$  deep. One nest was placed in the bend of a drooping bough, and from below looked a mere excrescence. They build in bread-fruit trees, *Casuarina*, and, in fact, on almost everything suitable. Mr. Storck writes that they are capital watchers, giving warning of approaching hawks. Eggs said to be blue.

ERYTHRURA PEALEI, Hartl.; F. & H. *op. cit.* p. 99.

This queer little Amadavat has not occurred to me personally, but has been sent me by my kind contributors, Messrs. Storck and Abbot, from the Rewa. The former writes, "Feeds on grass and other seeds, and minute insects. Native name 'Sithi.' Iris and bill black; feet and legs a dull pink. *E. pealei* occurs sparingly at Bua, on the north coast of Vana Levu; was procured there by Mr. Tempest." Kleinsmidt says, "called there Nrisi." I saw on the plantations on the Navua river, Viti Levu, a small *Amadina*? in flocks, that may have been *A. optata*; but that is not as yet known from any island in the Fiji group.

APLONIS TABUENSIS (Gmel.); F. & H. *op. cit.* p. 103.

This sombre-coloured bird seems pretty generally distributed. I obtained it at Randavu and Suva; Messrs. Storck and Abbot on the Rewa, my son on Loma Loma, Mr. Liardet on Taviuni. It is said to nest in the mangrove scrub; and a nest with slightly hard-set eggs, brought me from Wakaia (December 26th, 1874), was a loose structure, composed entirely of the fibre-like frond of *Casuarina*. Internal diam. 3", external 5"; depth 1" 9". Eggs blue (pale), and generally spotted with purple-brown spots. The natives on the Rewa call it "Kikaw."

MERULA VANICORENSIS (Quoy & Gaim.); F. & H. *op. cit.* p. 97.

Unless my memory much deceives me, this bird was shot on Kandavu by Dr. Goode, of H.M.S. 'Dido,' in August 1874.

PTILINOPUS PEROUSEI, Peale; F. & H. *op. cit.* p. 110.

This most lovely Dove, called by some the "Nutmeg Dove," seems pretty generally distributed, as I have seen it in, and received it from, Kandavu, Rewa (on Viti Levu), Ovalau, Wakaia, Mango, and Bua (on Vana Levu). I obtained eggs of it hard-set on October 7, 1874, and young birds just beginning to assume the purple of the

Pigeons were in such abundance that the captain of a merchantman and another, over there for a holiday, killed upwards of 100 between their landing one morning and departure next day on their return home. In common with the two next it is called "Rubé," or "Ruvé," by the natives. It lays two large white eggs, in December, axis 1" 7", diam. 1" 2".

CARPOPHAGA LATRANS, Peale; F. & H. *op. cit.* p. 140.

The "Barking Pigeon" of the settlers is generally distributed. To give some idea of the gastronomic powers of these large Pigeons, I annex the size of two seeds found in the crop of one, axis 4", circum. 3" 6"; axis 5", circum. 3". This was only the hard woody part, the *pulp had been digested!*

This bird is called "Sonki," or "Songi," by some natives, especially about Taviumi. It has fourteen tail-feathers. Mr. Storek writes from the Rewa that it feeds largely on the wild nutmeg, the large drupe-like seeds of some Laurinaceous forest trees, and the fruits of both the Kaufia Pakus.

I have received eggs laid in April, pure shining white, axis 1" 10", diam. 1" 3". Some natives say they only lay one egg; but this I doubt.

CARPOPHAGA PACIFICA (Gmel.); F. & H. *op. cit.* p. 142.

This large Fruit-Pigeon is not nearly so common as the two preceding; but it frequents similar places, and cannot be distinguished from them by voice or appearance when at any distance. It breeds in December; and its eggs, sent me from Wakaia, are pure white.

PHLEGÆNAS STAIRI (G. R. Gray); F. & H. *op. cit.* p. 147.

This singular but beautiful Ground-Dove is found at Ovalau, Wakaia, and Taviumi, and probably elsewhere, though it has not come under my notice in other places. The wonderful purple-copper sheen of the back and wing-coverts of an adult male are most beautiful, and excite the admiration of all beholders. Unlike any other Pigeon of these islands, it seeks its food entirely on the ground. Here it runs as quickly as a Quail, springs to its wings on the least alarm, and glides through the underwood to a place of safety with the rapidity of lightning.

Mr. Kleinsmidt has kept it in captivity for a long period; but it is so timid that on the approach of any one to its large cage it instantly runs into a corner, and crouches down, just as a Quail or other game bird would do. The natives call it Ngilu (written in the missionary jargon "Qilu"). It breeds in low bushes, making a flimsy nest, never out of the reach of a man's hand, and lays two eggs, white; axis 1" 3", diam. 10".

RALLINA PŒCILOPTERA, Hartl.; F. & H. *op. cit.* p. 156.

Generally distributed; inhabits the thick Taro beds and swamps. It is very shy, and rarely seen, but is, I believe, easily trapped by the natives, who call it "Mbidi." It lays six eggs (in a nest made



of sedges), of raspberry-and-cream-coloured ground, speckled chiefly at the obtuse end with light purplish and dark dry blood-coloured spots; axis 1" 6", diam. 1" 2". They nest in November and December, and, I think, also about March.

Bill rich salmon-colour; tips of both mandibles pale greyish. Legs and feet darker than the bill. Iris hair-brown.

*RALLUS PECTORALIS*, Less.; F. & H. *op. cit.* p. 157.

Found in the same situations as the former, but in greater numbers. This is also called "Mbidi" by the natives; in fact, I find that native names vary very much in different localities.

*ORTYGOMETRA QUADRISTRIGATA* (Horsf.); F. & H. *op. cit.* p. 164.  
Non vidi.

*ORTYGOMETRA TABUENSIS* (Gmel.); F. & H. *op. cit.* p. 167.

This minute Water-Rail is found far in the interior, my specimen having been captured at Naruku-ruku, our farthest point on the Rewa river, on the edge of the cannibal-country. I also saw another in the rushes by the river-side as I floated down in a canoe; and Mr. Boyd sent me one caught on Ovalau, where it was called "Mo" by the natives.

*PORPHYRIO VITIENSIS*, Peale; F. & H. *op. cit.* p. 172.

The Blue Gallinule, or "Tiri" of the natives, is pretty common, and generally distributed wherever there is suitable dwelling for it. It devours small fish, crabs, insects, sugar-cane (in too much abundance to please the planter), and berries, perching on trees readily to procure the latter, and is esteemed very good eating in its turn. It lives well in confinement, but is a dangerous neighbour to any other pets in the aviary. A pair I gave Mr. Kleinsmidt being placed too near the cage of some young Parrots (*Platycercus personatus*), drew them one by one through the bars, and picked out their brains with evident relish.

*LIMOSA UROPYGIALIS*, Gould; F. & H. *op. cit.* p. 177.

The "Godwit" is found sparsely scattered over all our sea-board, which is singularly devoid of waders. We often rode or walked for a whole day along the shore without seeing any thing but a solitary Heron (*Ardea asha*).

*ACTITIS INCANUS* (Gmel.); F. & H. *op. cit.* p. 182.

This sombre-clad Sandpiper is found solitary, or in little knots of three or four, on the shore-reefs of most of our islands, but is nowhere common. It runs quickly about along the edge of the pools, probing with its long bill in quest of worms or small crustaceans, and turning about very rapidly. In some places it is very shy; in others it will allow of easy approach within 15 or 20 yards. I have seen it, off and on, at all times of the year. Bill greenish (livid), base of lower mandible pale yellow. Legs livid greenish; soles of feet yellowish. Iris brown.

shelter of the island. January 10th, 1875: During the hurricane that has just prevailed here, the Frigate-birds again came in.

Drs. Hartlaub and Finsch do not include this bird in the Fijian avifauna. It is, however, I find, a constant resident, though I cannot hear of its nesting.

9. Descriptions of some new Operculated Land-Shells from Southern India and Ceylon. By Lieut.-Col. BEDDOME.

[Received May 19, 1875.]

(Plates LII. & LIII.)

*DIPLOMMATINA CANARICA*, n. sp. (Plate LII. fig. 1.)

Shell dextral, broadly ovate, scarcely or very inconspicuously rimate, flesh-coloured; whorls  $6\frac{1}{2}$ , convex, all except the apical obtuse one closely, regularly, and sharply costulated; interstices smooth; spire conical; the fifth whorl much the largest, and projecting much more than the penultimate; the penultimate with the constriction just in front of the centre of the circular aperture; peristome shining, continuous round the penultimate whorl, slightly canalicate in its free portion below; columellar margin much incurved; the tooth prominent, slightly deflexed: total length  $\frac{1}{10}$  inch.

North Canara, in moist forests about Yellapore, 2500 feet elevation,  $14^{\circ}$  N. lat.

Allied to *D. carneola* (Stoliczka); but the columellar margin is very different, and it is a stouter shell.

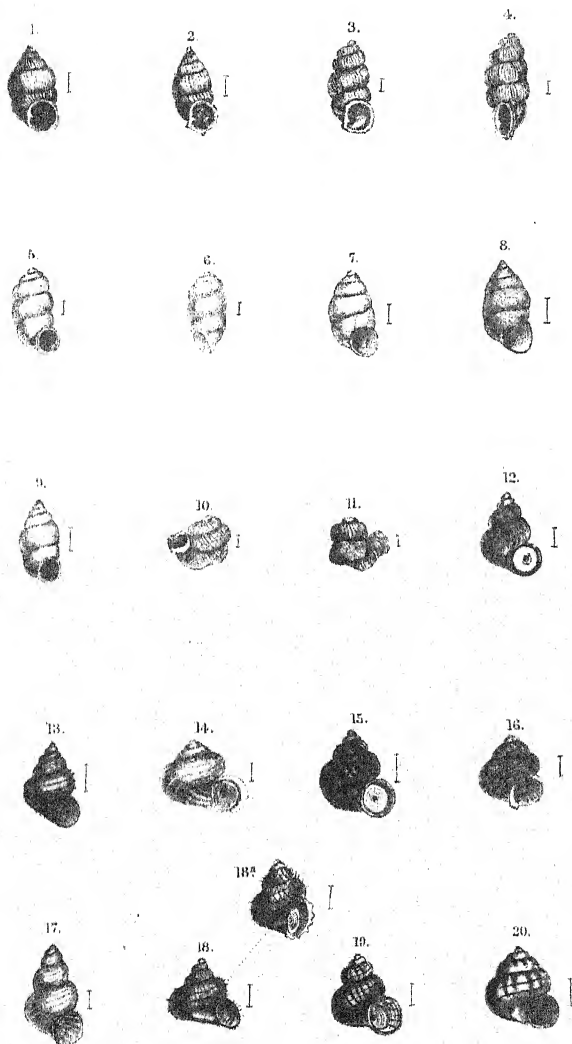
*DIPLOMMATINA GRACILIS*, n. sp. (Plate LII. fig. 2.)

Shell dextral, narrowly ovate, straw-coloured, not rimate; whorls  $6\frac{1}{2}$ , all except the apical or 2 upper ones rather distantly and prominently costulated, interstices smooth; spire rather slender, the fifth whorl the largest and projecting a little more than the penultimate, the penultimate with the constriction over the centre or right centre of the aperture, aperture reniform; peristome continuous round the penultimate whorl, prominently angled, below the tooth double, the outer lip expanded and reflexed, columellar margin nearly straight, the tooth prominent, a little deflexed: total length  $\frac{1}{8}$  inch.

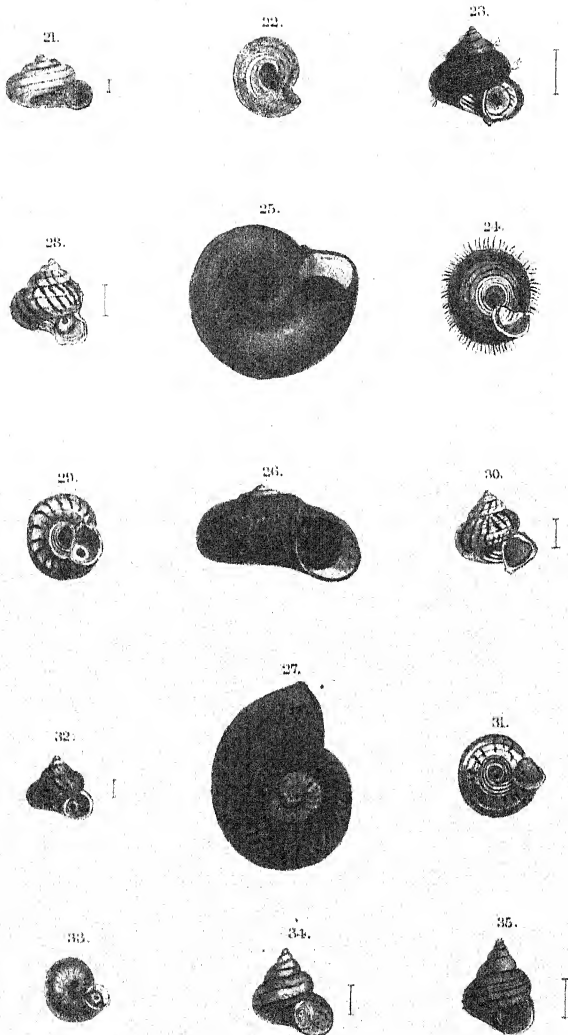
Gudam hills, Vizagapatam, 3000 feet elevation,  $17^{\circ}$  N. lat.

*DIPLOMMATINA MINIMA*, n. sp. (Plate LII. fig. 3 and 4.)

Shell dextral, cylindrical, straw-coloured, not rimate; whorls  $5\frac{1}{2}$ , convex, all except the two upper ones minutely costulated, sutures deep; spire blunt and tapering very slightly, the antepenultimate whorl not larger than the penultimate, the latter very slightly constricted; the position of the operculum over the centre of the aperture, aperture circular; peristome shining, continuous round the









lower portion of the penultimate whorl, double in its lower free portion, the columellar margin semicircular, the tooth small but plainly visible under the lens: total length  $\frac{1}{16}$  inch,  $2\frac{1}{2}$  times the breadth.

Gudam hills, Vizagapatam, with the preceding, but very rare. This is the smallest known species of *Diplommatina* true; it is quite a connecting link between Semper's genus *Moussonia* (*Pupa problematica*, Mousson) and true *Diplommatina*.

These are the first species of *Eudiplommatina* discovered in Southern India; the genus does not apparently occur on our western ghats south of  $14^{\circ}$  N. lat., where its place is taken by *Nicida*. Large tracts of the mountainous country in the Vizagapatam and Ganjam districts are conchologically quite unexplored; and other species will no doubt be some day discovered, particularly as *Nicida* is not found. On the Nallay-Mallay mountains, Kurnool district,  $15^{\circ}$  N. lat., I could not detect either *Diplommatina* or *Nicida*, though *Opisthostoma* was discovered; these hills, however, have been only superficially searched, and *Diplommatinas* will I think yet be found there.

**DIPLOMMATINA (NICIDA) ANAMALLAYANA**, n. sp. (Plate LII. figs. 5 and 6.)

Shell scarcely rimate, oblong, the apex suddenly contracted, thin, whitish, shining; whorls 5, convex, the apical one small, obtuse, the second much larger, the three lower all equal in breadth (giving the shell a very oblong form), all smooth except the last, which has a very minute transverse striation, and is furnished with a basal keel; aperture circular; peristome double, externally expanded, and reflexed: total length  $\frac{1}{14}$  inch.

Anamallays, in dense moist forests on the banks of the Peringoonda river, 2000 feet elevation, rare.

It is easily distinguished from all the other species by its very oblong form.

**DIPLOMMATINA (NICIDA) SUBOVATA**, n. sp. (Plate LII. fig. 7.)

Shell not rimate, conico-ovate, smooth, thin, shining, yellowish white, furnished with a subobsolete, very minute, oblique striation; whorls 6, convex, the penultimate the largest, the four upper ones gradually tapering, the apical one obtuse, the lowest whorl furnished with a rather prominent basal keel; aperture obliquely oblong; peristome single, not continuous round the penultimate whorl: total length  $\frac{1}{14}$  inch.

South-Canara ghats, moist forests, 1000-3000 feet elevation.

Allied to *Nicida nitidula*, Blanf., but differing in its single peristome and more prominent basal keel.

**DIPLOMMATINA (NICIDA) PEDRONIS**, n. sp. (Plate LII. fig. 8.)

Shell subcylindrico-ovate, prominently rimate, thin, smooth, of a pale dull olive-colour; whorls 7, convex, the antepenultimate the largest, the four upper ones gradually decreasing, the seventh or

last whorl suddenly ascending and touching the antepenultimate, inconspicuously keeled at its base; aperture oblique, subcircular, white within; peristome continuous, single, black externally, slightly reflexed and expanded: total length  $\frac{1}{7}$  inch.

Ceylon, near the summit of Pedrotalle Galle, the highest mountain in the island, rare.

*DIPLOMMATINA (NICIDA) CEYLANICA*, n. sp. (Plate LII. fig. 9.)

Shell not rimate, subcylindrico-ovate, thin, smooth, white, rather shining; whorls 7, convex, the antepenultimate the largest, the four upper ones gradually decreasing, the last whorl ascending slightly on the penultimate, keeled rather conspicuously at its base; aperture vertical, oblique; peristome continuous, single, scarcely expanded: total length  $\frac{1}{10}$  inch.

Ceylon; on Pedrotalle Galle, about halfway up from Newera Ellya, abundant.

These two latter were the first species of this genus detected in Ceylon; and at the same time (1870) I found two other species about Rambaddi, at a much lower elevation—one the common Indian *N. tiricincta*, and the other a species allied to my *N. anamal-layana*, and which I refrain from describing here as I have since received it from Mr. Neville under the name of *N. chrysallidea* (Neville), and do not know whether he has already described it or intends doing so. That gentleman has also forwarded me a single specimen of a very slender distinct species under the name of *N. depauperata*; and more will, no doubt, be discovered in Ceylon and the western chain of ghats in the Madras Presidency.

*OPISTHOSTOMA DECCANENSE*, n. sp. (Plate LII. figs. 10 and 11.)

Shell irregularly rhomboidal, pale pink, with an oblique rather distant costulation, prominent on the lowest whorl, but less so on the others; whorls 5, excentric, the two apical ones very small and depressed, and only visible as a single small speck from a side view, the third much larger, convex, the fourth, or penultimate, convex, very large, and much dilated, lowest whorl constricted as usual and in front of the constriction deflected inwards, but not concealing the umbilicus; aperture reversed, circular, quite vertical and parallel with the penultimate whorl; peristome touching the centre of the penultimate whorl, double, both lips slightly dilated, with a broad channel between them: total length  $\frac{1}{8}$  inch, breadth  $\frac{1}{4}$  inch.

A smaller shell than *O. fairbanki* (Blanf.), and the costulation less prominent; the two apical whorls are much more depressed, the penultimate whorl is much larger, the deflection in front of the constriction is less sharp, and not, or only partially concealing the umbilicus; the peristome is more completely double, with a wide space between the two lips; and the aperture is quite circular.

Nallay-Mallay hills, Kurnool district, common on the Yerra Chalma, about 3000 feet elevation.

I have also a single specimen collected on the Sivagherry hills, Tinnevely district.



*OPISTHOSTOMA DISTORTUM*, n. sp.

Shell irregularly rhomboidal, pale-coloured, with an oblique rather distant costulation; whorls 4, excentric, the upper one very minute and depressed, not visible from a side view, so that the shell appears as with only three convex whorls, second whorl moderate, third or penultimate much larger than the second or fourth, lowest whorl constricted as usual, and in front of the constriction deflected upwards, but not concealing the umbilicus; aperture subangularly circular, pointing upwards, its apex in a line with the apex of the shell; peristome touching the upper part of the penultimate whorl, double, the lips not much dilated and with little space between them: total length  $\frac{1}{2}$  inch, greatest breadth  $\frac{1}{8}$  inch.

Golcondah hills, Vizagapatam,  $17\frac{1}{2}^{\circ}$  N. lat., elevation 3000 feet, rare; by far the smallest species yet known. Only one specimen was found, and this is now with Mr. Blanford, or has been mislaid; and the description is from notes and a rough drawing made at the time it was collected.

*CYATHOPOMA (JERDONIA) NITIDUM*, n. sp. (Plate LII. fig. 12.)

Shell inconspicuously umbilicated, pyramidal, turreted, smooth, shining, of a yellowish olive tint, apex rather obtuse, sutures deep, a very minute oblique striation is generally visible under the lens; whorls 5, convex, smooth, the lowest scarcely descending towards the aperture; aperture circular; peristome continuous, single, thin; operculum double, thick, surrounded by a sulcate margin, externally very slightly concave; the nucleus very large, half the diameter of the circle, very thin, transparent, shining, destitute of whorls, the outer portion externally shelly, internally membranaceous, furnished with an exquisitely close spiral sculpture: length of shell varying from  $\frac{1}{2}$  to  $\frac{1}{4}$  inch, breadth of lowest whorl  $\frac{1}{2}$  inch.

Anamallay mountains, 6000 feet elevation. South-Canara ghats, 4000 feet; a shell of very simple structure, closely allied to *Cyclostoma trochlea*, Bens. (*Jerdonia*, Blanford), but without any carinations, and a much smaller umbilicus; the operculum is very similar, but with a larger transparent nucleus and much more closely wound.

The operculum of *Cyathopoma wynadense*, *procerrum*, and *kolamallense*, is very similar to that of this shell, only differing in being a little more concave externally; so I propose that these species should be referred to *Jerdonia*, which, however, can, I think, only be kept up as a subgenus.

The operculum of *Mychopoma hirsutum* and *limbiferum* is quite that of *C. wynadense* and its allies, and only thicker in proportion to the size; there is the same transparent nucleus destitute of spiral whorls, and the same outer calcareous texture; and they must, I think, also be referred to the *Jerdonia* section of *Cyathopoma*.

The operculum of *filocinctum*, the type of *Cyathopoma* and its allies (i. e. *deccanense*, *kalryenense*, *malabaricum*, and *conoorensense*), is at first sight very different; the margins of the outer shelly portion are much dilated and partially arched over, leaving a wide

gaping mouth, so that it is externally very concave; they have otherwise the same structure and the same diaphanous nucleus as in *Jerdonia*, and the two are only modifications of the same structure. Further on I describe three species of this section, in which the outer shelly portion is completely arched over, leaving only a small hole in the centre, so that the operculum is very convex, or papilliform, externally.

*CYATHOPOMA (JERDONIA) BLANFORDI*, n. sp. (Plate LII. fig. 13.)

Shell thin, umbilicated, pyramidal, turreted, straw-coloured, apex attenuated and subacute; whorls 6, sutures prominent, all the whorls, except the two small apical ones, prominently carinated; carinations two to three on the third whorl, three to five on the fourth, five to seven on the lowest, those about the umbilical region rather distant; umbilicus pervious; aperture circular; peristome thin, single, continuous, inconspicuously crenulate; operculum as in the last species: length  $\frac{1}{4}$  inch, greatest diameter  $\frac{1}{11}$  inch.

Tinnevely mountains, 4000 feet elevation.

I have a closely allied species from Ceylon, *Jerdonia dickoyensis* (Nevill, MS.); it is rather smaller, with a finer carination, and much smoother about the umbilical region; and I think specifically distinct.

*CYATHOPOMA (JERDONIA) ALBUM*, n. sp. (Plate LII. fig. 14.)

Shell widely umbilicated, depresso-turbinate, furnished with a chalky white or whitish brown epidermis, having a minute vertical striation, which is early deciduous, or only present in patches, the shell beneath being of a peculiar shining white horny texture; spire conoidal, apex subacute; whorls 4-5, spirally lirate, the lowest with four to five, the penultimate with three ribs or lines, more prominent before the loss of the epidermis; the umbilicus prominently spirally ribbed within; aperture circular, oblique; peristome thin, simple, continuous, slightly angled at the inner base at the termination of the first rib round the umbilical region; operculum externally very concave, with the margins of the outer shelly layer much raised but straight and not at all arched, multispiral, with a small transparent nucleus: length  $\frac{1}{11}$  inch, breadth  $\frac{1}{12}$  inch.

Yellagherry mountains, Salem district, 2500 feet elevation; Sirumallay hills, Dindigal, 3000 feet elevation; also, I believe, in Ceylon, as I have several poor specimens of what appears to be quite the same shell, collected at Dimbola, in the central provinces.

This shell is evidently allied to *Cyathopoma kalamallense* (Blanford), which I have not seen; and I think that I should have considered it that species, only Mr. Blanford, who has seen my specimens, pronounced it distinct.

*CYATHOPOMA (JERDONIA) ANAMALLAYANUM*, n. sp. (Plate LII. fig. 15.)

Shell umbilicated, turbinate, with a conical apex, glabrous, with a

very inconspicuous vertical striation; epidermis yellowish, with broad, oblique, bright chestnut, vertical bands, white beneath the epidermis; whorls 6, convex, with deep sutures, and very faint spiral lines, generally visible on the two to three lower whorls under a powerful glass; the lowest whorl somewhat flattened below and keeled round the umbilical region, which is white and striated within, and less open than in *C. malabaricum*; aperture a little oblique, oblong; peristome, when adult, double, not dilated, continuous, before maturity simple, thin, and a little interrupted at the apex, where it touches the penultimate whorl; operculum a little retracted, a little concave externally from the slight elevation of the margin of the outer shelly portion, closely multispiral, with a moderate transparent nucleus: length  $\frac{1}{4}$  inch, greatest diameter  $\frac{1}{8}$  inch.

Anamallay hills, 6000 feet elevation, in the evergreen woods or sholas; Pulney hills, 6000 feet elevation, a rather smaller variety.

This is a glabrous species, with the same markings as *malabaricum*; it, however, is very much larger and more conical, not at all depressed, less prominently striated, has a differently shaped umbilicus and a different operculum: the spiral liration is very inconspicuous; and I did not detect it till I was very carefully comparing this with *ceylanicum*.

CYATHOPOMA (JERDONIA) OVATUM, n. sp. (Plate LII. fig. 16.)

Shell umbilicated, ovate, spirally lirate, furnished with a light, bright brownish, obliquely striated, thread-like epidermis, and a few hairs along the spiral costulations, white beneath the epidermis; spire conical, apex subacute; whorls 5, the lowest with about eleven spiral costulations continuous down to the umbilicus, the four upper lines nearest the suture less conspicuous, or subobsolete; the penultimate with three to four spiral lines, umbilicus moderately open, spirally lirate within; aperture oblique, oblong, the vertical and spiral lines clearly visible on the inside of the whorl; peristome continuous, or a little interrupted at the apex on the penultimate whorl, double, except on its inner or left margin; the outer lip expanded and reflexed on its outer margin, contracted at its base and again prominently expanded at the base of the columellar margin, the inner one white, shining, and minutely crenulated on its outer and lower margins; operculum as in *C. wynadense*, with a moderate transparent nucleus: length  $\frac{1}{4}$  inch, greatest breadth  $\frac{1}{13}$  inch.

Yellagerry hills, Salem district.

The epidermis and spiral costulations are very similar to those of *filocinctum* and *wynadense*; it is, however, a smaller species, and ovate, not turbinate in form, and with a different operculum. *C. filocinctum* has the inner lip of the peristome furnished with large, prominent, obtuse, white crenations; and the spiral ribs or costulations on the base of the lowest whorl are always continuous up to the umbilical region, there being no intervening smooth space. *C. wynadense* has the inner lip of the peristome smooth; and the spiral costulations on the lowest whorl are generally interrupted by a smooth space

before the umbilical region is entered; but this latter character is not constant, as some of my specimens have the costulations continuous up to the umbilical region, as in *filocinctum*, so that it cannot, in the absence of the operculum, be looked to as a characteristic to distinguish them; but the peristome, where the shell is adult, is a safe character.

*CYATHOPOMA (JERDONIA) SIVAGHERRIANUM*, n. sp. (Plate LII. fig. 17.)

Shell pyramidal, turreted, thin, umbilicus very small and obscure, straw-coloured, glabrous, spirally lirate, apex attenuated, obtuse; whorls 5, convex, the two lower with five spiral lines scarcely raised, antepenultimate with 2-4 lines, aperture vertical, circular; peristome simple, thin, continuous or slightly interrupted at its apex; operculum double, with a sulcate margin, internally membranaceous, externally shelly, but only a little concave, as the margins are only slightly raised, nucleus central, transparent, moderate: length  $\frac{1}{14}$  inch, greatest diameter  $\frac{1}{17}$  inch.

Sivagherri mountains, 3000 feet elevation.

This comes nearest to *J. blanfordi*, but is very much smaller.

*CYATHOPOMA (JERDONIA) ATROSETOSUM*, n. sp. (Plate LII. figs. 18, 18 a.)

Shell umbilicated, ovate to subturberate, spirally lirate, thin, semitransparent, whitish, furnished with a deciduous brownish vertically but inconspicuously striated epidermis, subobsolete on some specimens; spire conical; whorls 5, rounded, furnished with numerous close, rather inconspicuous spiral lines, along which are numerous, rather distant, patent or suberect long black lines; umbilicus more or less open, with a more or less prominent keel at its entrance, inconspicuously ribbed or smooth within; aperture subvertical, circular; peristome single, subdouble or double, entire or with the outer margin beautifully crenated; operculum subdouble, externally white and shelly, and a little concave from the margins being raised, multispiral, with a large central transparent nucleus, internally membranaceous, convex, yellowish, shining: length  $\frac{1}{10}$  inch, greatest diameter  $\frac{1}{10}$  to  $\frac{1}{11}$  inch.

South-Canaraghat, 3000 feet elevation; Anamallays, higher ranges.

The peristome, the umbilical region, and even the shape of the shell are very variable, both in the S. Canara and Anamallay specimens.

*CYATHOPOMA (JERDONIA) ELATUM*, n. sp. (Plate LII. fig. 19.)

Shell narrowly umbilicated, ovato-pyramidal, spirally lirate, epidermis brownish, furnished with distant prominent vertical striae and a fine very minute striation also present between them; spire conical, apex subacute, sutures deep; whorls 5, rounded, furnished with numerous rather close spiral costulations, continuous down to the ribbed umbilical region; aperture vertical, circular; peristome double, the inner one continuous, quite entire or very inconspicuously crenate, outer more or less expanded and reflexed, continuous all round except at the left apex, where it comes into contact with the

base of the penultimate whorl; operculum as in *C. procerum* &c.: height  $\frac{1}{8}$  inch, greatest breadth  $\frac{1}{10}$  inch.

Golcondah hills, Vizagapatam district, 3000 feet elevation.

Very near *C. procerum*, but with rather a different epidermis and more ovate, having a broader base.

On the higher ranges of the Anamallays (6000 feet elevation) I collected three poor specimens of a species nearly allied to this and *C. procerum*, but without an umbilicus; it is probably quite distinct.

CYATHOPOMA (JERDONIA) VITREUM, n. sp. (Plate LIII. figs. 21 and 22.)

Shell openly umbilicate, depresso-turbinate, or rather subdiscoidal, the spire scarcely raised, whitish, of a shining glass-like texture, without any epidermis; whorls 4, the lowest terete, not descending angulari-convex, with three spiral prominently raised costulations round the region of the periphery, and one between them and the umbilical region, the upper portion nearest the suture non-lirate, or sometimes a fifth line is there present, penultimate angulari-convex, bilirate, the two apical whorls very small; umbilical region spirally lirate within; aperture a little oblique, subcircular; peristome single, thin; operculum double, with a very small central transparent nucleus, a little concave externally from the margins being slightly raised, outer layer less shelly than usual: greatest diameter  $\frac{1}{11}$  inch, height  $\frac{1}{25}$  inch.

Sivagherry mountains (Tinnevely district) 1000 feet elevation.

This comes nearest to *C. album*; but numerous specimens of all ages show no signs of any epidermis, and it is of a more depressed form, and of a glassy rather than a horny texture; the operculum is much less concave and scarcely shelly.

CYATHOPOMA (JERDONIA) SETICINCTUM, n. sp. (Plate LIII. figs. 23 and 24.)

Shell moderately umbilicate, turbinate, rather solid, spirally lirate, furnished with a brownish epidermis, which has a minute vertical striation, very hairy along the periphery, and slightly so about the sutures, but otherwise glabrous, white beneath the epidermis; spire conical (not convex or depressed, as in *C. hirsutum*); whorls 6, convex, sutures deep, the lowest terete, descending a little rather suddenly in front, with 12-15 continuous raised spiral costulations between the suture and the keel of the umbilical region, two of which at the region of the periphery are more raised than the others, and furnished with very long patent dark brown hairs, and between these two there are one or rarely two less prominent beardless costulations, penultimate with six to seven costulations, the upper and lower sutures slightly hairy, antepenultimate with five or six, and the whorl above it with two or three less prominent lines, the two apical whorls small and nearly smooth; umbilicus pervious, exhibiting all the whorls, not surrounded with a hairy fringe outside (as in *C. hirsutum*), spirally ribbed within, and there furnished with a strong raised thread-like sinuate or curved sculpture (more prominent than that in the same region of *C. hirsutum*); aperture oblique,

subcircular; peristome thick, double, the inner one pearly white inside and crenated (but less prominently than in *C. hirsutum*), outer one dilated on its outer and lower margins, particularly at its right apex and left base, and somewhat reflexed, more or less sinuate (but not with prominent crenations as seen in *C. hirsutum*); operculum double, externally concave, shelly, with a small transparent central nucleus: height  $\frac{1}{4}$  inch, greatest diameter  $\frac{5}{16}$  inch.

Anamallay mountains, moist woods on the banks of the Sholayar, a large river, 2000 feet elevation.

Nearly allied to *Mychopoma hirsutum*, but not furnished with the same curious, raised, thread-like epidermis, except within the umbilicus, and without any umbilical fringe; it is, besides, a smaller, differently shaped shell, and differs in other minor points, as indicated above. It has exactly the operculum of *M. hirsutum*, which, as before stated, does not differ from that of *Cyathopoma wynadense*; and some other forms that I refer to this *Jerdonia* section of *Cyathopoma* and *Mychopoma* cannot be kept up.

**CYATHOPOMA (JERDONIA) CEYLANICUM**, n. sp. (Plate LII. fig. 20.)

Shell prominently umbilicated, turbinate, with a conical blunt apex, inconspicuously spirally lirate, epidermis glabrous, yellowish, with obliquely vertical bright chestnut bands and a very inconspicuous vertical striation; whorls 5, convex or subangular, the lowest with two inconspicuous lines or ribs along the region of the periphery, and sometimes a third still more obsolete between them and the suture; penultimate with two carinations, the lower one almost touching the suture and sometimes obsolete, antepenultimate inconspicuously uncarinate; umbilicus somewhat angled at the entrance, smooth within; aperture nearly vertical, circular; peristome subdouble, continuous, inconspicuously angled or crenated at the exit of the two carinations of the lowest whorl; operculum as in *C. anamallayanum*: length  $\frac{1}{6}$  inch, greatest diameter  $\frac{1}{8}$  inch.

Ceylon, common in woods about the Rambaddi waterfalls.

Very like *C. anamallayanum*, but distinguished under the lens by its much more prominent though still inconspicuous carination; it is also of greater diameter with reference to its length.

**CYATHOPOMA LATILABRE**, n. sp. (Plate LIII. figs. 28 and 29.)

Shell deeply and prominently umbilicated, turbinato-globose, glabrous or subglabrous, epidermis of a pale yellowish brown colour, with oblique vertical dark chestnut-coloured bands and a minute vertical striation, white beneath the epidermis; spire conical, apex subacute; whorls five or six, the lowest smooth in its upper half near the suture, in the region of the periphery surrounded with three rather prominent carinations with a smooth space between them and the umbilical region, the penultimate and antepenultimate with generally two less prominent lines or ribs; lowest whorl cylindrical, slightly descending with an inconspicuous swelling followed by a slight contraction just in front of the reflexed peristome; the

umbilicus furnished with very prominent spiral ribs up to the very apex of the shell; aperture a little oblique, subcircular; peristome half-double; the inner lip dilated and much angled on its outer margin, small and continuous round the inner margin, outer lip irregularly angled on its outer margin, and much dilated at the inner basal margin, where it suddenly terminates, not being continued round the inner portion of the aperture; operculum externally milky white, shelly, papilliform, smooth, flattened at the apex, where it is furnished with a small circular aperture, inner layer membranaceous, slightly concave externally, with a central diaphanous nucleus, multispiral, the edges of the whorls raised: height of shell  $\frac{3}{16}$  inch, the greatest diameter equalling the height.

South-Canara ghats, 2000-3000 feet elevation.

The operculum is an exaggerated form of that of the typical *Cyathopoma filocinctum*, the margins of the outer shelly layers are arched over and almost meet in the centre, forming a papilla with only a small hole in the centre.

CYATHOPOMA TRAVANCORICUM, n. sp. (Plate LIII. figs. 30 and 31.)

Shell deeply and prominently umbilicated, turbinato-globose, glabrous, with rather obsolete vertical chestnut markings, spirally lirate, but not striated vertically; spire conical, apex subacute; whorls 6, the lowest with seven to eight carinations, commencing near the suture and generally but not always interrupted by a small space in front of the umbilical region, the same swelling and contraction is present near the mouth as in *C. latilabre*, the penultimate and antepenultimate with two to four carinations; the umbilicus furnished with very prominent spiral ribs up to the very apex of the shell; aperture a little oblique, subcircular; peristome double, inner lip continuous, dilated and crenated on its outer and lower margins, outer lip irregularly angled on its outer margin and reflexed, much dilated at its inner basal margin, subobsolete round the inner margin; operculum as in *C. latilabre*: greatest breadth  $\frac{1}{5}$  inch, extreme height about the same.

Travancore mountains, 3000 feet elevation.

Very similar to *C. latilabre*, but rather larger, and with many more carinations on the lowest whorl, and the inner peristome crenated instead of simply angled; the swelling near the aperture is peculiar to those two species, and somewhat as in *Alyceus*, but in a much less marked degree.

CYATHOPOMA SHEVAROYANUM, n. sp. (Plate LIII. figs. 32 and 33.)

Shell prominently umbilicated, turbinate, a little depressed, spirally lirate, epidermis dark fuscous, scarcely hairy, but with numerous very minute vertical striations, and a few larger prominent distant ones; spire conical; whorls 5, the lower one with four rather inconspicuous costulations round the region of the periphery, smooth in the upper portion near the suture, and with a broad smooth space

in front of the umbilical region, the upper whorls with inconspicuous costulations; umbilicus lirate within, but not very conspicuously; aperture oblique, subcircular; peristome double, not dilated, and quite smooth; operculum as in *C. filocinctum* and *C. malubaricum*; but occasionally the outer whorl is completely arched over, leaving only a very small hole in the centre (as in *C. latilabre*): greatest diameter  $\frac{1}{10}$  inch, height scarcely as much.

Shevaroy and Yellaghirry hills (Salem district).

This species comes nearest to *C. kabryenense* (Blanf.), but wants the crenated aperture and is considered distinct by Mr. Blanford.

*CYCLOPHORUS SUBPLICATUS*, n. sp. (Plate LIII. figs. 25, 26, 27.)

Shell broadly umbilicated, depressed, solid, of a dark chestnut brown and covered with a dusty fuscous epidermis when young, closely striated obliquely and inconspicuously, spirally lirate, and and ornamented with oblique rather inconspicuous scarcely raised folds or plications which are angled above the region of the periphery on the lowest whorl and again run backwards; spire slightly elevated, apex obtuse, sutures deep; whorls 4, convex, the last descending slightly towards the peristome; aperture oblique, subcircular, angled at its left apex; peristome double, both lips continuous, the inner white, the outer scarcely expanded except at its left apex; operculum of a single horny thin layer, subconcave externally, with 6 spiral whorls: diameter  $1\frac{1}{16}$  inch, height  $\frac{3}{8}$  inch.

Ceylon, on the Haycock mountain, 40 miles from Galle.

Very like *C. layardi* (Adams), but with the spiral lines much less prominent and furnished with peculiar oblique folds, and the peristome less reflexed.

*CYCLOPHORUS BILIRATUS*, n. sp. (Plate LIII. fig. 34.)

Shell umbilicated, turbinate, furnished with a thick dark epidermis, which is soon obsolete on the fourth or fifth upper whorl, but always present on the lowest one, where it forms an oblique, coarse, hair-like striation most prominent round the periphery and at the suture of the two lower whorls, and generally round the umbilicus, where it forms quite a fringe; colour below the epidermis dull olive; spire conical, apex subacute; whorls 6, the five upper ones smooth, convex, or sometimes the fifth (or fourth and fifth) with a slight rib round the centre; lowest whorl with two prominent raised ribs round the periphery, with a broad flat space between them, below convex, smooth or with several raised striæ, the whorl descending slightly near the mouth; aperture oblique, subcircular, slightly angled at the termination of the ribs at the peristome; umbilicus more or less striated within; peristome single, thin, continuous, or slightly interrupted on the penultimate; operculum of a single layer, thin, horny multispiral, concave externally, nucleus small, central: height of shell  $\frac{3}{16}$  of an inch, slightly more than the breadth of the lowest whorl.

South-Canara range of ghats, 2500 feet elevation.

This shell is closely allied to *Cyclophorus cuspidatus*, Bens. (*Craspedotropis*, Blanf.); it has exactly the same operculum (the



two not being in any way distinguishable), which, however, seems scarcely to differ from that of many typical species of *Cyclophorus*, except, perhaps, in being more closely wound, certainly not enough to constitute a subgenus, and *Craspedotropis* cannot be kept up; the epidermis is much the same in both, but less fringed in this species; the ribs or keels are the same; but this wants the acuminate form and the concave sides of the spire so peculiar in *C. cuspidatus*.

CYCLOPHORUS SALEMENSIS, n. sp. (Plate LIII. fig. 35.)

Shell moderately umbilicated, turbinate, with the spire rather acuminate, of a dull olive-green, furnished with a dirty dark brown, obliquely striated, thread-like epidermis, which is early deciduous on the upper whorls, but always present on the lowest, and round the umbilicus, where it forms a fringe; whorls 6, the upper five generally smooth, convex, or the fifth more or less bilirate towards its termination; lowest whorl a little descending in front, convex below, furnished with five prominent spiral costulations above the region of the periphery, and four to five below it, which latter are only conspicuous towards the termination of the whorl; umbilicus spirally lirate within; aperture oblique, subcircular, angled at its apex; peristome single, continuous, angled at its apex, and suddenly contracted a little below the apex of its right margin, and slightly angled at the centre of the same margin (at the exit of the lower or most prominent of the costulations round the periphery); operculum as in *C. biliratus* and *cuspidatus*: length  $\frac{7}{32}$  inch, and the greatest diameter equalling the length.

Shevaroy hills, Salem district, very rare; only two specimens were procured.

Nearly allied to *C. biliratus* and *cuspidatus*.

Typical specimens of all these species, except *Opisthostoma distortum*, have been deposited in the British Museum.

EXPLANATION OF PLATES LII. & LIII.

Fig. 1. *Diplommatina canarica*, p. 442.

2. — *gracilis*, p. 442.

3, 4. — *minima*, p. 442.

5, 6. — (*Nicida*) *anamallayana*, p. 443.

7. — (—) *subovata*, p. 443.

8. — (—) *pedronis*, p. 443.

9. — (—) *ceylanica*, p. 444.

10, 11. *Opisthostoma deccanense*, p. 444.

12. *Cyathopoma* (*Jerdonia*) *nitidum*, p. 445.

13. — (—) *blanfordi*, p. 446.

14. — (—) *album*, p. 446.

15. — (—) *anamallayanum*, p. 446.

16. — (—) *ovatum*, p. 447.

17. — (—) *sivagherrianum*, p. 448.

Figs. 18, 18 a. *Cyathopoma* (*Jerdonia*) *atrosetosum*, p. 448.

19. — (—) *clatum*, p. 448.

20. — (—) *ceylanicum*, p. 450.

21, 22. — (—) *vitreum*, p. 449.

23, 24. — (—) *seticinclum*, p. 449.

25, 26, 27. *Cyclophorus subplicatus*, p. 452.

28, 29. *Cyathopoma latilabre*, p. 450.

30, 31. — *travancoricum*, p. 451.

32, 33. — *shevaroyanum*, p. 451.

34. *Cyclophorus biliratus*, p. 452.

35. — *salemensis*, p. 453.

## 10. Supplementary Notes on African Buffaloes.

By Sir VICTOR BROOKE, Bart. F.Z.S.

[Received June 1, 1875.]

(Plate LIV.)

Since the publication of my paper on African Buffaloes in the Society's Proceedings for 1873 a large mass of material has passed under my observation, enabling me in some degree to confirm, and in some degree to modify the opinions expressed in that communication. In my former paper I grouped my observations under two heads:—first, as to the identity of the *Bos pumilus* of Turton with the *Bubalus brachyceros* of Gray; second, upon the possible identity of the smaller species of Buffalo of Eastern Africa mentioned by Heuglin and others with *Bubalus pumilus*.

For the convenience of comparison and reference, I will adhere to the same order in the remarks which follow.

First, as to the identity of the *Bos pumilus* of Turton with the *Bubalus brachyceros* of Gray. My conviction of the specific identity of the types upon which these names were conferred rested in 1873 chiefly upon the two following facts:—first, that the skulls of the FEMALE Buffaloes brought by Dr. Baikie from his Niger expedition resemble in every important particular the specimens brought from Central Africa by Captain Clapperton, which latter are the types of *Bubalus brachyceros*; and, second, that a small Buffalo's skull and horns in my own collection (P. Z. S. 1873, p. 475. figs. 1 & 2) present characters exactly intermediate between the type of *Bubalus pumilus* and the skulls and horns of the MALE Buffaloes brought by Dr. Baikie from the Niger, and Pel from the Gold Coast. It therefore appeared to me natural to conclude that the specimen named *Bos pumilus* by Turton represented the male of the same species as that on which Dr. Gray 30 years subsequently conferred the name *Bubalus brachyceros*, upon an examination of female specimens.

The localities from which both the type of *Bubalus pumilus* and my own specimen were obtained being unknown, however, constituted a serious gap in my chain of facts. This gap I am now, through the kindness of Mr. Walker, enabled in large measure to fill—he having lately sent me from the Gaboon the skull and horns of a Buffalo, which so exactly resemble my specimen as to leave no doubt that both are referable to the same species, namely the small Buffalo of Western Equatorial Africa. In addition to this I have lately seen in the Zoological Gardens at Antwerp a very fine living female of the West-African Buffalo, which was sent about a year ago, direct from Sierra Leone.

A comparison of Mr. Wolf's beautiful coloured sketch of this specimen (Plate LIV.), and of the detailed description of it which I shall give presently, with M. Du Chaillu's description of the "*Niari*" of Equatorial Africa (Expl. Eq. Afr. p. 175), proves beyond doubt the specific identity of the Buffaloes of Sierra Leone and of that country.

The specific identity of this West-African Buffalo with that obtained by Captain Clapperton in Central Africa appears equally certain, as Dr. Gray\* in his remarks on the living Buffalo in the Surrey Zoological Gardens, states that it resembled Captain Clapperton's specimen in being of "a nearly uniform pale chestnut-colour."

We are, I think, therefore justified in concluding that there is but one species of Buffalo in Western, Western Equatorial, and Central Africa, and that the oldest name for this species is that given by Turton.

Now, as to the possible identity of the smaller species of Buffalo of Eastern Africa mentioned by Heuglin and others with *Bubalus pumilus*:—

During the last three years a large number of specimens of the N.E.-African Buffalo have been brought to England by collectors and sportsmen, all of which I have had the opportunity of examining. I have also again seen the living animals in the Berlin Zoological Gardens, of which the male's head is figured in my former paper (P. Z. S. 1873, plate 42). I am therefore at present in a much better position than I was upon that occasion to define clearly the characters of this eastern form and to estimate correctly the amount of difference which exists between it and the true *Bubalus pumilus*. As will be seen from the descriptions which follow, the external differences are very much greater than the examination of the skulls alone had led me to apprehend, and I have no longer any doubt of the practical expediency of regarding the two forms as specifically distinct. Notwithstanding, I am still unable to find any important distinctive cranial or cornual characters serving to separate the two forms which are not shown to be fugitive upon the comparison of a large series of specimens.

At the time of writing my former paper, I was under the impression that *Bubalus caffer* extended from Southern Africa into Abyssinia. I now find that this southern form is unknown in Abyssinia, its place being taken by its smaller representative, *Bubalus caffer*, var. *equinoctialis*, of Blyth.

I will now give the descriptions and dimensions of the three forms of African Buffaloes; for the full synonymy of *Bubalus pumilus* I would refer to my former paper.

#### BUBALUS PUMILUS.

1781. *The Dwarf*, Penn. Quadr. p. 30. no. 10, pl. 27. fig. 3.

1806. *Bos pumilus*, Turton, Transl. Syst. Nat. p. 121.

1837. *Bubalus brachyceros*, Gray, Mag. Nat. Hist. vol. i. (n. ser.) p. 587.

1861. *Bos brachyceros*, Du Chaillu, Expl. Eq. Afr. p. 175 &c.

1863. *Bubalus reclinis* and *B. planiceros*, Blyth, P. Z. S. pp. 157, 158, figs. 3 & 4.

*Female about three years of age*, all the permanent incisors except the two external teeth being in place (Zoological Gardens, Antwerp, received from Senegal):—

\* Ann. Nat. Hist. 1839 (1st ser.) p. 284, t. 13.

Hair harsh, on the body and limbs of moderate length, longer on the withers and upper and underparts of the neck. General colour bright yellow. On the shoulders and anterior parts of the body there is a strong tinge of brown, caused by an intermixture of brown and yellow hairs. On the flanks and belly the yellow shades gradually into deep rufous. Upper parts and sides of the head and neck pure yellow, lower surface of head and neck paler. Entire upper and lower lip, fore limbs from above the carpi, and hind limbs from below the tarsi downwards black. Ears about 10" in length and 6" in breadth, narrowed gradually towards their tips, which, from their flexibility and length, curl back upon the ear-conches. Internally the upper rim of the ear-conch is covered with pure yellow hair of about 5" length, hair of similar length and colour forming two marked lines along their inner surface. Hair on the lower rim of the ear-conch and on the tip black. Tail bare, excepting the terminal tuft, which is black.

Height at the shoulder about 42". Horns slightly compressed at their bases, and directed upwards. The head is remarkably long in proportion to the body, which is compact and powerful, the limbs short.

*Male, adult.* Generally darker than the female (*Du Chaillu*). Horns greatly compressed from above downwards and broad at their bases, which are traversed in unworn specimens by numerous sharply marked irregular ridges. Beyond these ridges the horns are suddenly contracted into round smooth points, which are directed upwards and sometimes boldly backwards. The basal portion of the horn in most ADULT specimens rises slightly but decidedly from the horizontal upon leaving the skull; in other specimens, however, as for example in the type, the entire horn is directed upwards. Length of horns round the curve about 21", their diameter at the base 7".

*Female, adult.* In the female the horns are much less compressed at the base than in the male. As in the male, the direction of the points of the horns is very variable. Length of horns round the curve 17", their diameter at the base 4 $\frac{1}{4}$ ".

*Range.* Western, Western Equatorial, and the northern parts of Central Africa.

Typical specimens of *Bubalus pumilus* may be distinguished from typical specimens of *Bubalus æquinoctialis* :—

1. By their much smaller size.
2. By the general colour being yellow instead of brown. In *Bubalus pumilus* the black of the nose and limbs contrasts strongly with the yellow ground-colour of the rest of the animal. In *Bubalus æquinoctialis* the entire animal is, as stated below, uniform dark brown.
3. By the horns rising much more from the horizontal than is the case in *Bubalus æquinoctialis*.
4. By the long hair hanging from the ear-conches being pale yellow instead of dark brown, as is the case in *Bubalus æquinoctialis*.

The principal figure of Plate LIV. represents the female in the Antwerp Gardens, above referred to. The side figure represents the head of a young male, the skull of which is in my collection.

## BUBALUS ÆQUINOCTIALIS.

1866. *Bubalus caffer*, var. *æquinoctialis*, Blyth, P. Z. S. p. 371, figs. 1 & 1a.

1872. *Bubalus centralis*, Gray, Cat. Rum. Mamm. Brit. Mus. p. 11.

1873. *Bubalus pumilus* b. *stirps orientalis*, Brooke, P. Z. S. pp. 480, 483, pl. xlii.

Hair coarse and scanty, longest along the ridge of the back and under surface of the head, general colour of the entire animal uniform blackish brown, slightly tinged with rufous on the sides and flanks. Tail bare, terminal tuft black. Ear-conches fringed with long brown hair, longest in females. Horns short, not greatly exceeding the skull in length, separate at their bases, which are very much flattened, spreading almost horizontally outwards, and retreating but slightly from the plane of the eyes. Height at the shoulder 50".

*General range.* North-eastern Africa.

Typical specimens of *Bubalus æquinoctialis* may be distinguished from typical specimens of *Bubalus caffer* :—

1. By the smaller size of the former.
2. Adult specimens of *Bubalus caffer* are much blacker than similar specimens of *Bubalus æquinoctialis*.
3. The horns of *Bubalus æquinoctialis* are flattened at the base and short; those of *Bubalus caffer* are boldly convex and of great size.
4. In the very different direction of the horns in the two species.

## BUBALUS CAFFER (Sparm.).

Hair scanty, general colour of the entire animal black. Horns very large, their length exceeding twice that of the skull, declining greatly from the horizontal and dipping boldly downwards and backwards; their basal anterior surfaces raised into immense convex bosses. Height at the shoulder about 59".

*General range.* Africa south of the Equator.

*Conclusion.*

In conclusion I would simply say that although for the present it seems to me decidedly advisable to regard the three forms of African Buffaloes as distinct species, each known by a separate name, I am fully aware of the slender basis upon which their distinctive characteristics rest. I have, indeed, already seen specimens of Buffaloes from the Upper Zambesi of strikingly intermediate characters between *Bubalus caffer* and *Bubalus æquinoctialis*. Between this latter form and *Bubalus pumilus* the difference of external characters appears to signify a wider breach; but that these superficial differences may be found deceptive is, I think, rendered probable by the very remarkable gradation of characters exhibited in a large series of skulls, the gradation of characters taking place more or less step by step with the gradual spread of the animals over their geographical range.

11. Notes on the Wild Goat, *Capra ægagrus*, Gm.

By C. G. DANFORD, F.Z.S.

[Received May 29, 1875.]

During a recent visit to Asia Minor, made principally with the view of studying the ornithology of that country, an opportunity was afforded of observing the habits of the Wild Goat (*Capra ægagrus*), some specimens of which are now submitted for the inspection of members of the Society. The following remarks pretend to convey but little, if any, new information on the subject, and are merely intended as a slight contribution to the history of the animal and as a corroboration of the statements of some authors respecting it.

The range of the *Capra ægagrus* seems to be, with the exception of the northern side of the Caucasus, entirely confined to Western Asia and certain islands of the Ægean. There is no authenticated instance of its having been found in other parts of Europe; for, although many authors have asserted that it existed in the alpine regions of Switzerland and Greece, and though Goats from these localities have even been figured as *C. ægagrus* by Cuvier and Schinz, yet all these reports and instances may be referred to hybrids between the Ibex (*C. ibex*) and the tame Goat, or to tame animals which have in certain localities become semi-wild and have more or less reverted to the appearance of the supposed original stock. Early writers generally assign Persia as its habitat, particularly the provinces of Lar and Khorasan. Dr. Brandt mentions (Tchihatchef, 'Asie Mineure,' p. 684) that it was found by Ménétriés on the northern side of the Caucasus, was reported rare in the mountains of Ahalzik by Mr. Norman, and that many specimens were sent from the neighbourhood of Tiflis by Mr. Hohenacker.

Pallas (Spic. Zool. fasc. xi. p. 43) extends its range to the Kirghiz steppes—an extension, however, which seems to want further proof. Mr. Low says (Breeds of Domest. Animals, The Goat, p. 3) "the *Ægagrus* inhabits Western Asia, from the Caucasus eastward by the countries of the Caspian to an unknown distance, and southward through the highlands of Persia and Cabul to Hindostan."

Tchihatchef, in his fine work on Asia Minor, writes:—"This animal is not very rare in the mountains of Cilicia which border the plain of Tchukurova, and in the mountains of Marach; but their favourite regions are the mountains of Aladagh, Boulgardagh, and Hassandagh." At the Bereketli Maden (mines), in the first-mentioned of these ranges of the Taurus, M. Tchihatchef collected in 1848 a series of skulls and horns, which he presented to the Imperial Museum at St. Petersburg. According to Herr Kotschy, who has given a very interesting account of this species (Verhandl. d. zool.-bot. Ver. in Wien, 1854, p. 201, and Reise in d. cilicischen Taurus, p. 249), it is found in all Asia Minor, Kurdistan, Armenia,

Caucasus, and north and south Persia, being most abundant in the latter; he found them numerous on the Kuh Daena, near the old city of Susa, and on the plateau of Persepolis. Mr. Hutton (Calcutta Journal, vol. ii. p. 521) reports it common in Afghanistan, in the Soolimaun and Pisheen hills, and in the Huzzareh and western ranges. Fitzinger (Sitzungsber. d. k. Akad. vol. xxxvi. p. 741) says it occurs in the island of Scarpanto.

Erhard (Fauna d. Cycladen, p. 29) considers the Goats of Joura and Skopelos to be true *Ægagri*, and identical with those of Crete. He distinguishes, however, as a different species, or at least as a well-marked variety, an animal which is found in small numbers on the little rocky island of Antimelos, and which he describes under the name of *Ægoceros pictus*. He also remarks that the Goats of Joura are now rare—though, according to Von d. Mühle (Ornith. Griech. p. 2), they were so common in 1839 that a party of Greek soldiers who were stranded on that island killed many of them with their bayonets.

Mr. Blanford remarks (Proc. Zool. Soc. 1874, p. 248):—"It appears probable that the Wild Goat of Northern Persia, Asia Minor, and Crete is the same as that of Southern Persia and Sind;" and Sir Victor Brooke has informed me (*in litt.*) that "*C. ægagrus* extends from Samothrace and Crete, through Asia Minor and Persia into Sind." He adds that "many modifications of the species no doubt occur through this great and varied range: for instance, the smooth-horned or Sind *Capra ægagrus* is considerably smaller than the Wild Goat of Asia Minor; it is also somewhat different in its coloration, the ground-colour of the body being very much paler, and the facial markings more intense and sharper-defined." These differences he attributes to the effects of climate and locality, but has no doubt that it is the same species.

Without attempting to investigate the early history of *C. ægagrus*, we may observe that this species is alluded to by some of the ancient writers. Varro mentions the Wild Goats of Samothrace under the name of "*Rotæ*" (lib. ii. cap. i.); and those of Crete are referred to by Cicero (De Nat. Deor. lib. ii.). Bochartus (Hierozoic. cap. xxiii. p. 918) thinks that Oppian means a particular species by the term *αἰγυγρος*, "as, after speaking of the pugnacity of a certain kind of Goat, he passes to the *Ægagrus* as to a race of Goat distinct from all others." According to Cuvier (Desmarest, Dict. d'Hist. Nat. vol. vi. p. 422), "*Le Paseng paroît être l'Hippélaphe d'Aristote et le Tragélaphe de Pline, dont la patrie indiquée par ces auteurs est la même que celle de cet animal, et dont les descriptions lui conveniennent également.*"

It seems to have been tolerably well known among the earlier authors of more recent times as the Paseng, which inhabited Persia, and is evidently the same animal which Albertus refers to as the "*caper montanus*" of Crete (see Gesner, C. 'Hist. Animal.' p. 332), "*Nullum animal cursu et agilitate tantum pollet et simul tam ingentia cornua habet quam caper montanus.*" It is chiefly in connexion with the celebrated Bezoar stones that mention of the animal

is made. The most efficacious of these concretions were generally admitted to be those which came from Persia, and which were found in the stomach of the Wild Goat of that country. It is doubtless of this species that Monardes writes (see Clusius, 'Simp. Med.' ed. 3, lib. iii. p. 41), although he is inclined to make it a link between the Deer and Goat, and to extend its range to Africa. He describes it as having the size and agility of the Stag, "Sed cornibus in dorsum reflexis et corporis forma capreis fere simile, quam ob causam, ab incolis capra montana vocatur, tametsi meo indicio cervi-capra potius dici debeat." Garzias also says (see Clusius, 'Aromat. et Simp. Med.' lib. i. cap. xiv. p. 164), "Est in Corasone et Persia Hirci quoddam genus, quod Pazan lingua Persica vocant rufi aut alterius coloris (ego rufum et prægrandem Goæ vidi) mediocri altitudine, in cujus ventriculo fit hic lapis Bezahr." These accounts are confirmed by Acosta (see Clusius, 'Aromat.' &c. p. 59) who states that the hunters are able to tell what animals are suffering from these concretions, which he says are sometimes so large as to cause death\*.

The above authors are quoted by Aldrovandus (Quad. Bisulc. Hist. p. 755) and Bauhinus (Monog. de Lap. Bez. cap. xvii. p. 97), and Bontius (De Lap. Bez. p. 165); the latter adds, "It is not dissimilar to the goat of Europe, but the horns are longer and more erect."

In Ray (Syst. Animal. p. 80), Charleton (Exercitationes, p. 69), and others, we find little but repetition on this subject until we come to Kæmpfer, who (Amœn. Exot. fasc. ii. p. 396, p. 406. fig. 2) describes the animal which produces the Bezoar stones as "fera quædam montana caprini generis, quam incolæ Pasen, nostrates Capricervam nominant." The description which he gives of this Capricerva agrees pretty well with the *Ægagrus*; but he makes the since often repeated mistake of assigning to the female no horns, or even traces of them. Dr. Brandt (Tch. Asie Mineure, vol. ii. p. 671) considers that the animal which Kæmpfer has figured represents a species of *Ibex*; but it is hard to say what so rude an illustration really stands for.

Brisson (Reg. Animal. p. 44) has introduced confusion into the matter by identifying with the Pasan of the above authors some species of Antelope, though he gives it a beard like a Goat; of the horns he says, "Cornua ipsi teretia sunt, recta, sat longa, ab imo ad summum fere annulata, apice tantummodo lævi." He also refers to the Wild Goat of Crete as *Capra cretensis* or the *Ovis* of most other authors. The animal figured by Houttuyn (Nat. Hist. p. 206, pl. xxiv. fig. 2), who quotes Kæmpfer, also belongs to the Antelope tribe, though called by him *Cervicapra*, or the Bezoarbock.

Linnæus has identified the *Hircus bezoarticus* of Aldrovandus, the *Capra bezoartica* of Ray, and the *Capricerva* of Kæmpfer with an animal which lives in Persia and produces the Bezoar stone, and

\* The word Bezoar, Bezahar, Pasahar, &c., is, according to some authors, derived from the Persian *Pa*, against, and *Zahar*, poison; while others say that it is merely a corruption of *Pasen* or *Pasan*, the Persian for Goat.



which he describes as "*Hircus cornibus teretibus arcuatis, ab imo ad summum fere annulatis*" (Syst. Nat. ed. 12, p. 96). Of this description Mr. Blanford says (Proc. Zool. Soc. 1874, p. 248), "It cannot be identified with any known Persian ruminant."

D'Aubenton has figured as the Gazelle du Bezoard, Pasan-of the Orientals, some species of Antelope; he gives, however, a skeleton-figure of, and describes (tom. xii. p. 195, pl. 15) under the name of *Capricorne*, an animal which he considers intermediate between the Goats and Antelopes, and which Cuvier thinks is certain to have been a young *Ægagrus*.

Pallas, in his earlier writings (Misc. Zoog. p. 8; Spic. Zool. fasc. i. p. 14), was misled into identifying an animal which he calls *Antilope bezoartica*, and which he admits was only known to him by its horns, with the Pasen and Pasan of Kämpfer and Buffon.

We now come to S. G. Gmelin, who (Reise d. Russ. Th. iii. p. 473) rescued the subject from the utter confusion into which it had fallen by describing from actual inspection specimens of the *Ægagrus*, called by him "*Ziege welche den Bezoar liefert*." His description, however, though good of the male, is curiously incorrect regarding the female, of which he says, "Several females have been brought to me; but I have not been able to find a trace of horns among any of them."

Pallas, in his next notices on this subject (Spic. Zool. fasc. xi. p. 43), avails himself of Gmelin's information, gives to the animal the name of *Ægagrus*, and considers it to be the same as that described by Monardus, Garcias, and Acosta, and identical with the Paseng of the Persians and the *Capricerva* of Kämpfer, and quite distinct from the *Antilope bezoartica* before described by himself.

Zimmerman (Spec. Zool. p. 662) has no doubt that it is the *Ægagrus* which is meant by Gmelin and Kämpfer; and Erxleben (Syst. Reg. Animal. p. 261) speaks of it as an animal much confused with the Ibex, and first of all well distinguished by Pallas.

The description which Pennant has given (Hist. Quad. vol. i. p. 57) of the *Caucasan* most probably refers it to this species.

The name *Capra ægagrus*, which is the generally accepted one, was first given to this species by J. F. Gmelin in his edition of Linnaeus (Syst. Nat. p. 193); he describes it as "*cornibus carinatis arcuatis, gula barbata*," and identifies it with the *Ægagrus* of Pallas, the *Goat* of S. G. Gmelin, the *Capricerva* of Kämpfer, *Steinbok* of Ridinger, *Chèvre sauvage* of Tavernier, and *Caucasan* of Pennant.

The animals figured by F. Cuvier under the name of *C. ægagrus* are, as has been already remarked and as he himself suspected, not *Ægagrus* at all, but either bastard or semi-wild Goats. They differ in colour, in the formation of the horns, and in having the hair of the face long instead of short.

Pallas, in his later writings (Zool. Ross.-As. vi. p. 227), gives it the name of *Ægoceros agagrus*, quoting Gmelin's descriptions, and mentioning that he found among his (Gmelin's) effects an unfinished sketch of the animal, and also the skull and horns.

Tilesius (Isis, 1835, p. 668), while remarking on the mistakes

made by Linnæus and Buffon, has himself fallen into the error of confounding the *Ægagrus* with the *Ovis tragelaphus* and the Bartschaf of Pennant.

Wagner (Suppl. to Schreber, pt. iv. p. 502) says, "Although these Goats are in their native countries (Persia, the Alps of Asia Minor, and the Caucasus) by no means rare, yet the imperfect descriptions which Gmelin has left, have not, up to this time, been completed." This completion he proceeds to make from a specimen in the Museum at Vienna, which was originally sent there by Dr. Brandt, to whose excellent article, which forms the bulk of M. Tschihatchef's chapter on *C. ægagrus*, I will refer the reader for detailed descriptions of the animal.

In the winter of 1873-74, while on an excursion up the valleys of the Meander and Harpasus, we made many inquiries respecting this species, but could obtain no evidence of its existence among the mountains of that district; and it was not until our next visit in December of last year that we met with it in the southern part of the country near Adalia.

The picturesque town of Adalia is situated at the head of the Gulf of the same name, and is the principal place in the once populous district of Pamphylia. It is surrounded on its landward sides by a wide brushwood-covered plain, bounded on the north and north-east by the Gök and other mountains of the Taurus, and on the west by the Solyman, a lofty spur of the same range, in which latter the present specimens were collected.

These mountains, the principal summit of which, the Ak-dagh (white mountain), attains a height of 10,000 feet (*Hoskyn*), rise abruptly from the plain and sea, and are of very imposing and rugged forms. The pure grey tints of the marble and marble-limestone of which they are principally composed show beautifully between the snowy summits and the bright green of the pines and darker shades of the undergrowth of oak, myrtle, and bay, which clothe their lower slopes.

The Wild Goat is here found either solitary or in small parties and herds, which number sometimes as many as 100; the largest which I saw contained 28. It is called by the natives *Kayeek*, which word, though applied in other parts of the country to the Stag, and sometimes even the Roe, is here only used to designate the *Ægagrus*, the Fallow Deer of this district being properly known as *Jamoorch*a. The old males of the *Ægagrus* inhabit, during summer, the higher mountains, being often met with on the snow, while the females and young frequent the lower and easier ridges; in winter, however, they all seem to live pretty much together among the rocks, scattered pines, and bushy ground, generally preferring elevations of from 2000-5000 feet. Herr Kotschy says they never descend below 4000 feet in Cilicia; but his observations were made in summer. Ménériés mentions (*Voy. Catal. Rais.*) that in the Caucasus they are not found under 1000 feet unless when driven down by hard weather. In the neighbourhood of Adratschan, at the southern extremity of the Solyman range, where the species is

abundant and the mountains are low, they often come down even in fine weather almost to the sea-level.

Gmelin (Reise d. Russ. Th. iii.) mentions that the *Ægagrus* lives in company with the Eastern Sheep (*Ovis gmelini*?).

Like all the Ibex tribe the *Ægagrus* is extremely shy and wary at ordinary times, though, as is the case with many other animals, they may be easily approached during the rutting-season. I was told that they were often brought within shot at that time by the hunter secreting himself and rolling a few small stones down the rocks. When suddenly disturbed they utter a short angry snort and make off at a canter rather than a gallop. Though their agility among the rocks is marvellous, they do not, according to Mr. Hutton (Calcutta Journ. vii. p. 524), possess sufficient speed to enable them to escape from the dogs which are employed to hunt them in the lowlands of Afghanistan. It is interesting to see how, when danger is dreaded, the party is always led by the oldest male, who advances with great caution and carefully surveys the suspected ground before the others are allowed to follow. Their food consists principally of mountain-grasses, shoots of different small species of oak and cedar, and various berries. The young are dropped in May, and are one or two (Kotschy says sometimes three) in number. The horns appear very early, as shown in a kid of the year procured in the beginning of January. It is to be regretted that we were not able to ascertain the sex of this specimen, the body having been partially eaten by Vultures before we could secure it. No doubt many of the young are destroyed by the larger raptorial birds, and a certain number by the Bears, Panthers, Lynxes, and Wolves; in addition to these ordinary foes, the Wild Goat suffers much from ticks and from an insect pest in the form of a peculiar bot, which locates itself in the frontal sinuses and the cavities of the horns, one of which, when cut open, was discovered to be entirely filled with these larvæ. Dr. Cobbold, to whom I forwarded some of these insects, writes, "The *Æstri* larvæ placed in my hands for examination appear to be totally distinct from any form which has come under my notice;" he also thinks that great distress must be caused by the ingress and egress of the bots in question. Herr Kotschy says that the Wild Goat is also infested by another parasite (Reise in cilisch. Tau. p. 258), which he describes as "not a tick; it was 3 lines long, brown in colour, and with a rounded abdomen, and escaped quickly from the dead animal into the beard of the hunter who was skinning it"\*.

The external characteristics of the *Ægagrus* having been already so well described by Dr. Brandt and others, I will only remark that its general colour undergoes the change usual to that class of animal, becoming lighter in summer, that there is a considerable variation in the depth of the ground-colour and the markings and the extent of the latter in various individuals, that the markings of the females and young are always much fainter than in the adult males, and that the females are always quite beardless. It is

\* The existence of *Æstri* larvæ in *C. ægagrus* is recorded by Dr. Murie (Proc. Zool. Soc. 1870, p. 80).

necessary to mention this, as both Fitzinger (Sitzungsber. d. k. Akad. in Wien, xxxvi. p. 471) and Blasius (Säugeth. Deutsch. p. 485) say, "both sexes carry a strong beard." Its size, Herr Kotschy remarks (Reise in cil. Tau. p. 441), "exceeds in every respect that of the European Ibex; and it attains not unfrequently a length of  $6\frac{1}{2}$  feet." This is quite likely to be correct, as a male of six years measured by myself was 5 feet  $5\frac{1}{2}$  inches from nose to tip of tail, and stood 2 feet  $9\frac{1}{2}$  inches at the shoulder; while a female of the same age was 4 feet long, and 2 feet 3 inches at the shoulder.

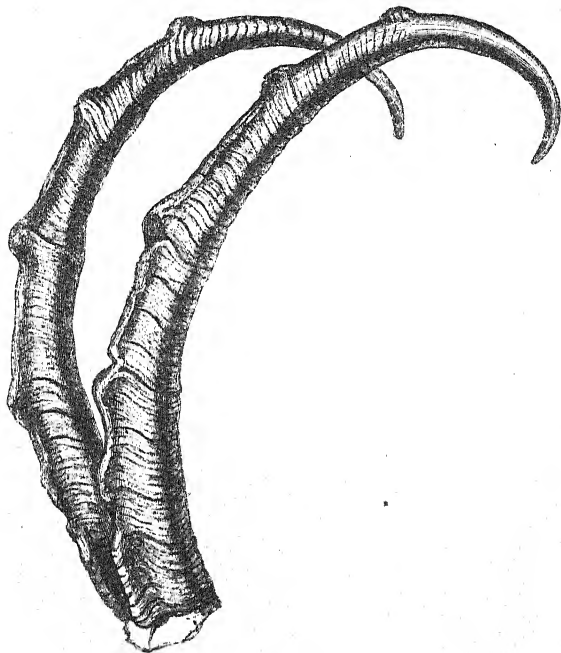
The development of the horn takes place, as has been shown, in the first year, and progresses in well-marked annual growths, the sizes of which are naturally regulated by the robustness of the animal and the supply of food. The yearly growths seem to be greatest from the third to the sixth year, the subsequent additions being successively smaller. The first well-developed knob may be generally taken to denote the termination of the third year. The greatest age attained in the present series seems to be (by the showing of these divisions) twelve years; but this is not the maximum, as Herr Kotschy mentions that "two splendid pairs of fifteen-year old Ibex were brought to him" (Reise in cil. Tau. p. 244).

The specimens now exhibited form part of a series of twenty-two pairs, eight of which I obtained from animals in the flesh. The finest head is that of a twelve-year old, and has the following measurements:—Superior curve  $47\frac{1}{2}$  inches, chord  $22\frac{1}{2}$ , spread 2, basal circumference  $9\frac{3}{4}$ , weight  $10\frac{1}{4}$  lbs. The greatest length which I find recorded is that in a living specimen possessed by Mr. Hutton, which had horns  $40\frac{1}{2}$  inches. A specimen in the St.-Petersburg Museum was 40 inches, and another 39 inches. The latter had the great girth of 12 inches (Tch. Asie Min. vol. ii. p. 679). There is, however, in the British Museum the horn of a twelve-year old, which measures  $48\frac{1}{2}$  inches on the curve; and even this I do not believe to be by any means the greatest length attained, having often been told by the native sportsmen of the Taurus that they had seen horns of six and seven spans, which, taking the largest pair before us roughly at  $5\frac{1}{2}$  spans, would give the enormous length of 5 feet. The spread of the horns varies much in the male; but the direction of the points in specimens from the Caucasus and Asia Minor is almost invariably inward.

When exhibiting some horns of *Capra agagrus* from Shiraz and Ispahan in Persia, Mr. Blanford remarked that they did not curve so much inward as those figured by Blasius in his "Wirbelthiere Europa's" (Proc. Zool. Soc. 1874, p. 248); and in some pairs, said to have come from Sind, which I examined, the direction of the points was decidedly outward; and Mr. Hutton's Afghanistan head had a width of  $22\frac{3}{4}$  inches. In the present series the horns in one case absolutely cross (fig. 1, p. 466), in another they meet, and all curve inwards with one exception. This latter specimen (fig. 2, p. 466), killed thirty years ago on the Mountain of Chander in the Solyman range, is further remarkable in that, though only the head of an eight-year

old, it stands second both in length and weight, while the distance between the points, viz. 27 inches, is the greatest width with which I am acquainted. There seems also to be a slight tendency to a spiral form, which makes me doubt whether it is the head of a pure *Ægagrus*.

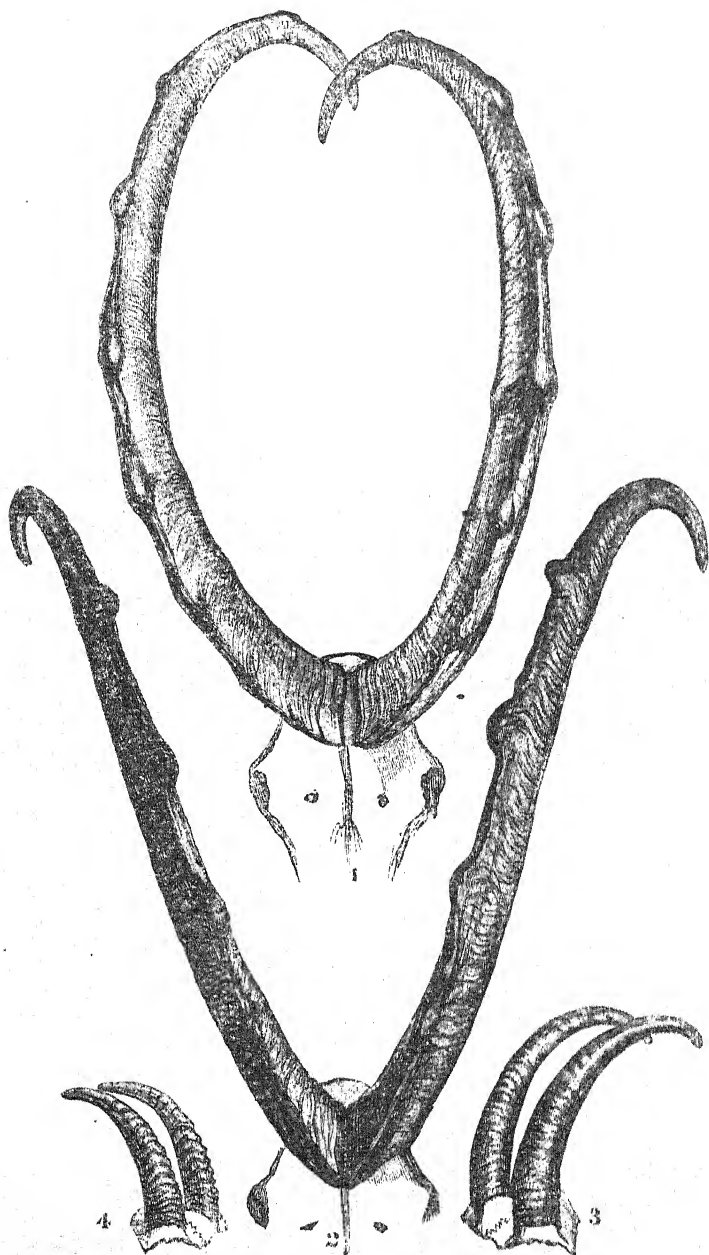
Horns are probably produced during the first year in the female as well as in the male; but their development is comparatively slight,



*Capra ægagrus*, typical form, male.

very little keel is formed, and the yearly growths are not nearly so distinct. Old female horns measured by Dr. Brandt and Mr. Hutton were 13 inches long, and the largest horn of my collection, from an animal about six years old, is 12 inches long, with a girth of 4 inches. The inward tendency of the points seems to be generally less in the female than in the male (figs. 3, 4).

Regarding the use of the great horns carried by the Ibex family, the general idea among the older authors was that they were employed to break the animals fall in leaping from a height. Pennant relates (*Hist. Quadr.* vol. i. p. 57) that Monardes was witness to the wild Goat saving itself in this way; and Gesner says (*Hist. Animal.* p. 332), "*cadens ab alto totum corpus inter cornua protegit a collisione et ictus lapidum magnorum excipit cornibus.*" This view is confirmed by Mr. Hutton, whose tame *Ægagrus* repeatedly used his horns for this purpose (*Calc. Jour.* vol. ii. p. 524).



*Capra aegagrus*. Figs. 1, 2, male; figs. 3, 4, female.

I made many inquiries among the native hunters; and they all agreed in saying that the horns were never so used, or for any purpose except fighting; and the result of my own observations is, that during the leap the head is carried as far back as possible, though it may be that the situations in which I observed the animals did not necessitate the employment of the horns in the way referred to.

The flesh of the wild goat is very good, tastes very much like venison, and has none of the unpleasant characteristics of the tame species. It is much esteemed among the Turks; and Belon relates (Paulus, Reisen in den Orient, Th. iv. p. 27), that the Greeks of Crete were accustomed to bake the Ibex whole, and that he frequently saw such entire dried animals hanging up in the mountain-huts. The skin is in request for praying-mats and a variety of purposes, while of the horns are made powder-flasks, drinking-cups, and even ramrods.

Most naturalists agree in considering the *C. ægagrus* to be the principal original stock of the ordinary domestic goats, while some go so far as to say that all our varieties are derived from it.

Berchem, however, considered the *Ægagrus* itself to be a variety of the Ibex, which he believes to be the real original stock of the tame breeds ("Betracht. u. d. wild. Ursprung d. Hausziegen," Hœpfners Mag. 1718, Bd. ii.) and ("Beschr. d. Nat. d. Steinbocks, d. Savoy. Alp.," *ib.* 1789, Bd. iv.). Sundevall thought that *C. falconeri*, Hugel, from Cashmere and Thibet, approached nearer to the domestic goat than *C. ægagrus*.

Giebel (Allgem. Zool. pt. i. p. 29) says that the certainty of *C. ægagrus* being the origin of the domestic goat is not based upon sufficient grounds. Mr. Hutton, in his interesting paper (Calc. Journ. vol. ii.), seems to hold the same opinion. He has tried in vain to procure a breed from two hybrids; and in crosses got from a hybrid by domestic goats he finds that the beard, which he says is possessed by the female of the Persian and Afghanistan tame breeds, is retained to the third generation; and arguing from the tendency of tame animals, when crossed by the wild stock, to return to their original condition, he says, "If the domestic breed is derived from the wild one, the former one being crossed by the original stock should revert to it, and the tendency to do this would appear in the absence of those peculiarities which were unnatural. Yet this is not the case; for although the beard is unnatural in the wild female, yet the half-breed and even the third generation of the cross retain it, thus showing it to be a natural characteristic in the tame goat, and that the breeds are distinct." I may remark that in a tame female goat which I examined the other day, and which was said to be of a pure breed, the hair was short and the ground-colour and markings almost identical with those of the *Ægagrus*, but the horns were absent, and the beard was present. Belon (Bemerk.; see Paulus, Reisen, Th. iv.) states that the Wild Goat of Crete breeds freely with the tame; and many hybrids have been produced in the Gardens of the Society by a female obtained in that island, which crossed freely both with the domestic breeds and with the Markhore (*C. megaceros*). According to Guldenstädt (Pen-

nant, Hist. Quad. vol. i. p. 59) the mountaineers of the Caucasus have never observed it to mix or couple with the common goats; and in that part of Asia Minor which we visited we neither saw nor heard of such crosses, all the tame goats being very dissimilar in appearance to the wild species. Having, however, heard of a man who had a tame *Ægagrus* a year old, I sent for him; but he refused to part with it for even what must have been to him a large sum, saying that he wished to try and breed from it. This shows that even in a country where they abound to such an extent that hunters number their slain by hundreds, interbreeding is by no means common. Dr. Brandt, who considers the *Ægagrus* "exclusively and incontestably the source of the domestic goat" (though he afterwards adds, not of all the breeds) (Tch. Asie Min. vol. ii. p. 687), adduces in favour of his opinion the strong argument that the skulls of the wild and tame males are almost identical, and there is absolutely no difference between those of the females. He also considers that the fact of the *Ægagrus* inhabiting those regions which are supposed to have been the earliest centres of civilization, is an additional proof.

Though, from my very limited knowledge of the Goat family, I am not myself capable of forming useful opinions on this vexed subject, I may say that while considering the *Ægagrus* to be the principal stock of the western breeds, there are certain points of difference, such as the presence of a beard among the tame females, and the very common tendency to a flattened and spiral form in the horns in both sexes, which induce me to think that the *Ægagrus* is not the sole source from which they spring, but that they have some connexion with such species as the Pyrenean, Caucasian, and Alpine Ibexes. Instances of interbreeding between the Alpine Ibex and the tame Goat have been recorded; and although there does not seem to have been any record of such a race having been perpetuated, yet the fact of the Goats procured from the Alps and figured by Cuvier, and which were themselves hybrids, having interbred (though, it is true, the young did not live) seems to show that such a descent might be possible. With regard to the form of the horns, though I do not pretend to say that those of the semi-wild Goats may not in some instances closely resemble the *Ægagrus*, yet, in all horns of this class which I have been able to examine, an inclination to a spiral form and an outward directing of the points have always been exhibited, and not a reversion to the true *Ægagrus*-type. They do, however, sometimes attain almost as large a size; for a pair from Wales 41 inches long is mentioned by Pennant (Hist. Quad. vol. i. p. 60), and there is an account in the 'Field' (Feb. 20, 1869) of two semi-wild goats shot by Lord Kennedy near Haverford West, in Wales, one of which had horns  $36\frac{1}{2}$  inches long, 39 inches across, and  $7\frac{3}{4}$  in girth; while those of the other, whose head more resembled the *Ægagrus*, were  $34\frac{3}{4}$  long,  $13\frac{1}{2}$  across, and  $7\frac{1}{2}$  in girth.

In conclusion, I would observe that the study of the original sources from which the Goat as well as others of our domestic animals have been derived seems to be one of great interest, and at the same time of still greater difficulty, and will require from any one who may attempt it much clear insight and patient investigation.



June 15, 1875.

Prof. Newton, F.R.S., V.P., in the Chair.

The Secretary read the following report on the additions to the Society's Menagerie during the month of May 1875.

The total number of registered additions to the Society's Menagerie during the month of May was 165. Of these, 100 were acquired by presentation, 34 by purchase, 4 by exchange, 18 by birth, 1 by hatch, and 8 were received on deposit. The total number of departures during the same period, by death and removals, was 113.

The most noticeable additions during the month of May were as follows:—

1. A Hairy Tree-Porcupine (*Cercolabes villosus*, F. Cuv.) from South-East Brazil, and

2. A Rock-Cavy, ♂ (*Cerodon rupestris*, Max.), from the same country. Both of these Rodents, which were purchased on May 5th of a dealer in Liverpool, are new to the Society's collection.

3. A fine example of the King Penguin (*Aptenodytes pennanti*) from the Falkland Islands, presented by Mr. Frederick E. Cobb, Manager of the Falkland-Islands Company at Stanley, Falkland Islands, received May 18th.

4. An example of an apparently new species of Monkey allied to the common Macaque (*Macacus cynomolgus*), presented by Dr. Marfels, Conservator of Forests to the King of Burmah, Mandalay, Burmah, and brought home by Dr. J. Anderson, F.Z.S., May 19th. Dr. Anderson will give us a complete description of this Monkey.

5. A small Wallaby of a species new to the Society's Menagerie, purchased May 28th. It appears to be, as kindly suggested by Mr. Gould, an example of the Agile Wallaby (*Halmaturus agilis*), Gould's 'Mammals of Australia,' ii. pls. 24 & 25, from North Australia.

6. An about half-grown Australian Cassowary (*Casuarus australis*), from Queensland, presented by E. P. Ramsay, Esq., C.M.Z.S., May 28th, making the second example of this hitherto little-known species now alive in the Gardens.

7. Two Jameson's Gulls (*Larus jamesoni*), from Sydney, N.S.W., presented by C. Moore, Esq., C.M.Z.S., May 28th, being the first example of this beautiful species we have received alive.

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A letter was read, addressed to the Secretary by Dr. A. B. Meyer, stating that he had made inquiries of Mr. Van Musschenbroek, of Ternate, as to the truth of the statement of Mr. Bruyn (P. Z. S. 1875, p. 30) that he had specimens of four species of Birds of Paradise living in his possession, and had ascertained that this was not the fact, and that the only living Birds of Paradise in Mr. Bruyn's possession were two examples of *Paradisea papuana*. The only foundation for the story was that Mr. Bruyn expected to get specimens of other species.

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Sir Victor Brooke exhibited original drawings by Mr. Wolf of the two species of Koodoo, *Tragelaphus strepsiceros* and *T. imberbis*\*, and pointed out the distinctions between these two animals. The figure of the latter was taken from a specimen received by Sir Victor Brooke from the Juba river, Somali Coast, which was, no doubt, the true habitat of this species.

Mr. Selater read a memoir on the Rhinoceroses now or lately living in the Society's Menagerie. This will be published in the Society's 'Transactions.'

Prof. Owen, C.B., F.R.S., read the twenty-first of his series of memoirs on the extinct birds of the genus *Diornis* of New Zealand, and their allies. The present paper contained an account of some bones of *Harpagornis moorei*, found in the turbaries of Glenmark, near Christchurch, New Zealand.

Dr. James Hector, F.R.S., exhibited a specimen of the pelvis of *Harpagornis moorei* of Haast, which had been found on the surface of the ground under a rock, in the province of Otago, New Zealand, by Mr. A. Low. It had been figured in Trans. N.Z. Inst. vol. vi., and was the property of the Colonial Museum, Wellington, N. Z.

Mr. G. Dawson Rowley, F.Z.S., exhibited skins of *Nasiterna geelvinkiana*, ♂ and ♀, which, as far as he knew, were new to this country; also an example of *N. pygmæa* ♂, to show the difference between the two species. It appeared that *N. geelvinkiana* was a trifle smaller than *N. pygmæa*.

The following papers were read :—

1. Descriptions of new or little-known Species of Bats of the Genus *Vesperugo*. By G. E. DOBSON, M.A., M.B., F.L.S., &c.

[Received May 28, 1875.]

#### GENUS VESPERUGO.

*Vesperugo*, Keys. & Blas. Wieg. Archiv, 1839, p. 312.

- a. Ears broad, rhomboidal; tragus expanded above and curved inwards; phalanges of third and fourth fingers short; a band of hair on under surface of the wing-membrane posterior to the forearm; wings not extending to the base of the toes; calcaneum distinct; premolars  $\frac{2}{2} \cdot \frac{2}{2}$ . Subgenus *Vesperugo*.

#### 1. VESPERUGO STENOPTERUS, n. sp.

Crown of the head very slightly elevated, almost level with the face-line; muzzle broad and flat, labial glandular prominences largely

\* *Strepsiceros imberbis*, Blyth, P. Z. S. 1869, p. 51.

developed, the upper lip symmetrically thickened. Ears short; the distance between the base of the inner margin of the ear-conch and the termination of the outer margin near the angle of the mouth is equal to the distance from the base of the inner margin to the summit of the ear; integument forming the conch very thick, especially the lower half of the outer side; tragus short, broad above, narrow opposite the base of the inner margin.

Feet wholly free from the wing-membrane, which is attached to the tibia a short distance above the ankle; this and the shortness of the phalanges of the third and fourth fingers cause remarkable narrowness of the wings. Postcalcaneal lobe small, termination of calcaneum indistinct; tip of tail free. Fur dark brown throughout; integuments and wing-membrane dark brown or black.

The muzzle in front of the eyes, both above and beneath, is almost naked; and the distribution of the fur upon other parts is similar to that in *V. noctula*.

The upper incisors are similar to those of *V. noctula*; but the second upper premolar is separated by a small space from the canine, through which the small first premolar may be seen from without.

Length (of an adult male preserved in alcohol), head and body 2"·35; tail 1"·7; head 0"·75; ear 0"·6; tragus 0"·25 × 0"·15; forearm 1"·55; thumb 0"·32; second finger 2"·6; fourth finger 1"·65; tibia 0"·55; foot and claws 0"·45.

*Hab.* Sarawak, Borneo.

Type in the collection of the British Museum.

- b.* Ears longer than broad, triangular; tragus reaching its greatest width below the middle of the inner margin, longer than broad; no postcalcaneal lobule; wings from the base of the toes; premolars  $\frac{2.2}{2.2}$ . Subgenus *Alobus*, Pters.

## 2. *VESPERUGO PULCHER*, n. sp.

Crown of the head slightly elevated above the face-line; muzzle shaped more like that of some species of *Vespertilio* (*V. emarginatus*, e.g.), and the glandular prominences between the nostrils and eyes less developed than in most species of *Vesperugo*. Ears about four fifths the length of the head, the ascending inner margin straight or faintly convex, the upper half of the outer margin slightly concave, terminating in a line directly below the eye, but on a lower level than the angle of the mouth; tragus nearly half the length of the ear, shaped like that of *V. serotinus*.

Posterior margin of the interfemoral membrane festooned with distinct papillæ arranged like the teeth of a comb.

Fur above sienna-brown, with shining tips, beneath *wholly pure white*; the dark-coloured fur of the back does not pass beyond a line connecting the angle of the mouth (when the head is extended) and the under surface of the humerus. Interfemoral, antebrachial, and wing-membranes between the humerus and femur white; the remaining parts of the wing-membrane pale brown.

Inner upper incisor long, with a second cusp on its outer side near the extremity. Outer incisor short, lying close to the base of the inner incisor. Second premolar in the upper jaw separated from the canine by a short interval, through which the small first premolar is distinctly visible from without. Lower incisors not crowded.

Length (of an adult male preserved in alcohol), head and body 2''·0; tail 1''·6; head 0''·7; ear 0''·6; tragus 0''·25; forearm 1''·35; thumb 0''·28; second finger 2''·6; fourth finger 1''·9; tibia 0''·52; foot and claws 0''·3.

*Hab.* Zanzibar.

Type in the collection of the British Museum.

This species resembles *V. (Alobus) temminckii*, Rüpp., but may be at once distinguished by the form of the tragus, which is narrowed towards the tip and subacutely pointed, by the deeply fimbriated margin of the interfemoral membrane, by its much greater size, &c.

- c. Ears triangular, the outer margin terminating in a distinct well-defined round lobe midway between the base of the tragus and the angle of the mouth; lobule at base of outer margin of tragus very small or absent; postcalcaneal lobe distinct; wings from the base of the toes; *base of the thumbs and soles of the feet with fleshy pads as in Tylonycteris*; premolars  $\frac{2}{2} \cdot \frac{2}{2}$ . Subgenus *Glischropus*.

### 3. VESPERUGO NANUS.

*Vesperugo nanus*, Peters, Reise nach Mossambique, i. p. 63.

Resembles *V. pipistrellus* in the general form of the muzzle and ears; but the ears are narrower, and their outer margin distinctly angularly emarginate opposite the base of the tragus, terminating in a sharply defined, projecting round lobule; the inner margin is regularly slightly convex from the base to the tip, which is shortly rounded off; the upper half of the outer margin distinctly concave. Tragus without triangular lobule or projection at the base, narrowest opposite the base, broadest opposite the upper fifth of the inner margin, the outer margin sloping inwards above to join the inner margin, and form with it a narrow rounded terminal projection curved slightly inwards.

Base of the thumb swollen, rounded, the surface marked with deep wrinkles; the sole of the foot similarly swollen and wrinkled, but flat, or slightly concave as in *Tylonycteris pachypus*; toes short, about half the length of the whole foot. Postcalcaneal lobe distinct, rounded, placed on the calcaneum at a distance equal to about three fourths the length of the foot from the end of the tibia. Tail as long as the head and body, the extreme tip projecting. Above dark brown or black, with shining tips; beneath brown or black at the base, with ashy extremities.

Upper incisors nearly equal in length, inner incisors bifid at extremities, outer unicuspidate. Lower incisors distinctly trifid, and not crowded. Second upper premolar separated from the canine by

a narrow interval, through which the small first is visible from without.

Length, head and body 1''·6; tail 1''·6; head 0''·55; ear 0''·45; tragus 0''·22; forearm 1''·2; thumb 0''·22; second finger 2''·25; fourth finger 1''·65; tibia 0''·5; foot and claws 0''·22.

*Hab.* Africa; eastern and western coasts.

#### 4. *VESPERUGO TYLOPUS*, n. sp.

Muzzle broad and evenly rounded in front; nostrils opening on a level with the glandular prominences on each side, and without intervening emargination; glands of the upper lip greatly developed, forming smooth, almost naked prominences, causing a furrow along the centre of the face behind the nostrils. Ears triangular, narrowed above, with rounded tips, the ascending part of the inner margin very faintly convex, nearly straight; the upper third of the outer margin straight, succeeded by a considerable convexity, causing the upper third to appear concave, then distinctly angularly emarginate opposite the base of the tragus, and terminating in a well-defined lobe midway between the base of the tragus and the angle of the mouth, but on a lower level than the mouth. This angular emargination and round terminal lobe are even better-defined than in *V. nanus*. Tragus faintly concave along inner margin, outer margin slightly convex, tip obtusely rounded off; a minute very acutely pointed projection slightly above the base of the outer margin.

Thumb rather long; *the whole of the lower surface of basal half occupied by a naked rounded callosity* of a pale yellow colour (in alcohol), with transverse wrinkles; the sole of the foot is similarly formed, but the surface is flat, or slightly concave. The light yellow colour of these callosities or elastic and adhesive pads of the thumbs and feet contrasts remarkably with the very dark colour of the integument of the surrounding parts.

Postcalcaral lobe distinct; extreme tip of tail projecting. Inner upper incisors long, bifid, the smaller cusp placed posteriorly and externally near the extremity; outer incisors very short, but in transverse diameter equal to the inner ones, placed in a plane slightly anterior, the single cusp sloping inwards and lying against the cingulum of the inner incisors. Lower incisors trifid, not crowded. First upper premolar internal, but visible from without.

Length, head and body 1''·55; tail 1''·5; head 0''·55; ear 0''·5; tragus 0''·2; forearm 1''·2; thumb 0''·26; second finger 2''·4; fourth finger 1''·65; tibia 0''·55; foot and claws 0''·26.

*Hab.* North Borneo.

Type in the collection of the British Museum.

The peculiar structure of the sole of the foot and of the inferior surface of the thumb has not been previously noticed in *V. nanus*, and has hitherto been described in the genus *Tylonycteris* only. Among other Mammalian orders an homologous condition of the sole of the foot is found in *Hyrax* (in the arboreal species especially) by which these animals are enabled to run up the smooth faces of rocks and climb to the summits of lofty trees. As these animals have no

prehensile claws, it would be impossible for them to mount trees without this special provision for climbing.

In *Tylonycteris* and *Glischropus* the fleshy foot-pads without doubt perform similar functions, probably enabling these Bats to cling to the under surfaces of large leaves and fruits, perhaps not so effectively, however, as the much more highly specialized pedunculated sucking-disks of *Thyroptera tricolor* enable that animal to adhere to smooth surfaces as securely as a fly.

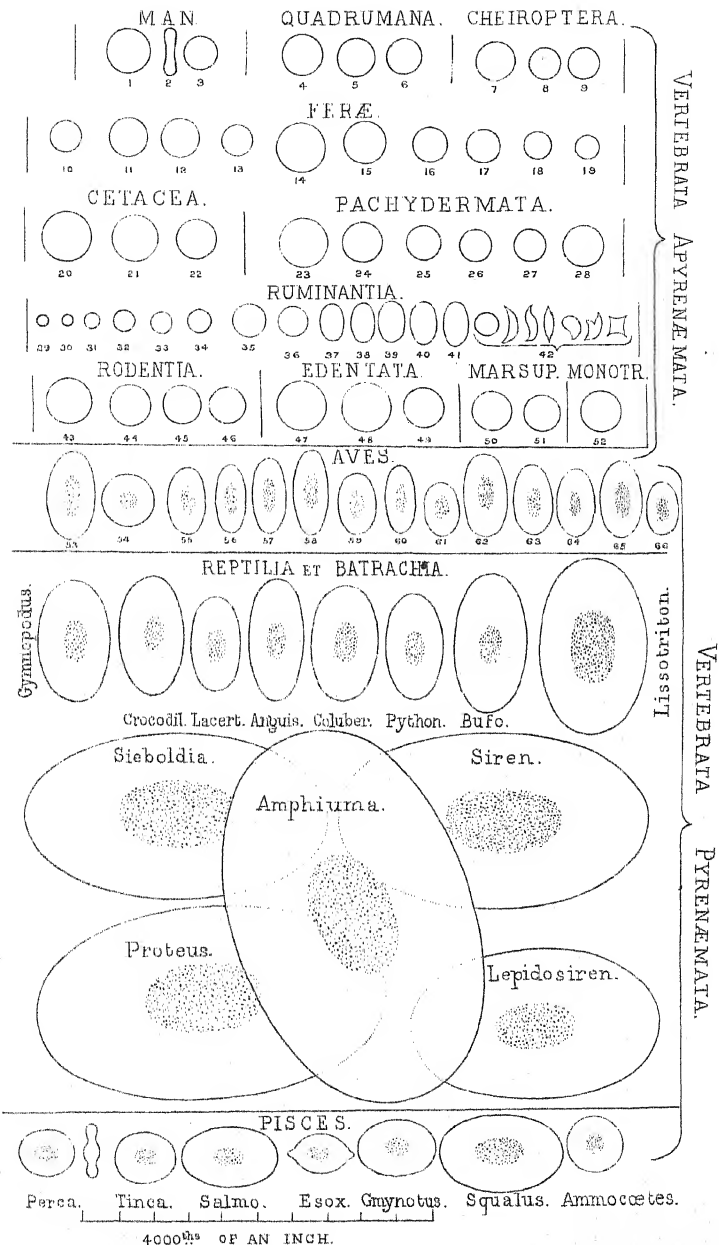
2. Observations on the Sizes and Shapes of the Red Corpuscles of the Blood of Vertebrates, with Drawings of them to a uniform Scale, and extended and revised Tables of Measurements. By GEORGE GULLIVER, F.R.S., late Professor of Comparative Anatomy and Physiology to the Royal College of Surgeons.

[Received May 31, 1875.]

(Plate LV.)

No physiologist is likely at the present day to undervalue, as John Hunter did, the importance of the red blood-corpuscles. They often afford valuable characters which, though regularly ignored in the books of systematic zoology, should always form a part of the descriptions of the orders, and sometimes of the species, of each class of vertebrate animals. Higher still is the physiological significance of the corpuscles; their relations of individual size and of aggregate proportions to the other constituents of the blood, and to the economy of the species (in which we now know that the corpuscles perform an important function intimately connected with their size and number), have become questions of much interest and moment which still require further investigation.

But such inquiry would be foreign to the present purpose, which is to give simply the averages, with brief explanatory comments, of numberless measurements, all made by me, in the hope that they may be useful towards further researches of the same kind. And so many are the facts either suggested or shown by my Tables, in relation to the significance of the comparative sizes of the corpuscles, that I can here make no attempt to consider or develop this branch of the subject. It has been admirably treated by Professor Milne-Edwards in his 'Leçons sur la Physiologie et l'Anatomie Comparée,' and was summarily noticed in my 'Lectures on the Blood, Lymph, and Chyle,' delivered at the Royal College of Surgeons, and reported (with engravings) in the 'Medical Times and Gazette,' 1862-3. On the taxonomic import of the nucleus of the red corpuscle, my observations (illustrated by woodcuts drawn to a scale) are published in the 'Proceedings' of this Society (P. Z. S. 1862, p. 91, et 1870, p. 92);



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RED BLOOD-CORPUSCLES.





the significance is intimated of the comparative minuteness of the corpuscles in the small species of single natural orders or families of Apyrenæmata and throughout the class of Birds.

Since the publication, upwards of a quarter of a century ago, of my Tables of Measurements, I have made so many additions and revisions by new observations, several of which have never been published, that nothing short of the present paper will suffice to give such a fair view of the whole series of averages as will be most useful for future reference, in relation to questions, often arising and likely to increase, concerning the import, whether taxonomic or physiological, of the sizes of the red corpuscles of the blood. The original Tables, which appeared in the 'Proceedings' of this Society (P. Z. S. 1845, p. 93) and in the Sydenham Society's edition of Hewson's Works, 8vo, 1846, followed my extensive observations on the same subject in the 'Lond. and Edin. Phil. Mag.' January 1840 to August 1842, and in the Appendix to the English version of Gerber's Anatomy, 8vo, Lond. 1842. Those measurements have been added to piecemeal up to the present year; and the tables from Hewson's Works were converted into French millimetres and transferred by Milne-Edwards to the first volume (8vo, Paris, 1857, pp. 84-90) of his great work already cited. Of course, as linear measurements only are used, all my remarks as to the sizes of the corpuscles are to be understood accordingly.

The measurements now recorded show the results of the labours of many years, and are far more copious than any others known to me, and, with the observations connected therewith originally, proved sundry facts, such as, *e. g.*:—the singular minuteness in the Tragulidæ of the red blood-corpuscles, their largeness in the Edentata and pin-niped Feræ, and batrachian character in *Lepidosiren*; the comparative sizes of the corpuscles in several of the subsections of the vertebrate subkingdom; the relation of those sizes to the sizes of the species in the orders or families of Apyrenæmata and throughout the class of Birds; the essential difference between the Pyrenæmata and Apyrenæmata, with the conformity of the Lampreys to the former and of the Camels to the latter type, and the identity of the corpuscles in placental and implanental Mammalia. On some points the engraved page in the 'Proceedings of the Zoological Society,' Feb. 25, 1862, contains such errors of omission and commission, caused by strange accidents, and is so deficient in later observations, that it is now given with the needful corrections and additions in illustration of the present paper. Specimens of the corpuscles in the different classes and orders are all drawn side by side to a uniform scale, of which each one of its ten divisions stands for  $\frac{1}{4000}$  of an English inch, and the whole length of the scale for  $\frac{1}{400}$  of an inch. The same design will be adopted, with unimportant modifications in the arrangement of the corpuscles and divisions of the scale, in the next edition of Professor Beale's excellent work on the microscope. Historical notices of the observations of my predecessors and contemporaries are given in the memoirs cited above, and in the notes to the edition of Hewson's Works already mentioned.

The present Tables, though so extensive, show how numerous are the Vertebrates of which we still require an examination of the blood-corpuscles. The sum of the facts at this time known on the subject is so far imperfect, that we are ignorant of how soon new ones may turn up to subvert even our most cherished theories or generalizations. Hence the remarks or deductions on the present occasion, being confined to the measurements given in the Tables, must be considered as provisional, subject to modifications or corrections to suit the advance of knowledge, especially as regards Fishes, Batrachians, Cetaceans, Sirenians, and some other Vertebrates. It is desirable, too, that my measurements should be subjected to experimental examinations by independent observers.

To rigorous accuracy these Tables, of the averages of a far greater number of measurements, have no pretension. In this respect all that can be candidly said is, that, though they have been carefully deduced from innumerable and generally correct observations of the corpuscles, the size of these is by no means invariable in a single species, and that, even were they ever so constant in magnitude, seeing how much they usually differ among themselves in every field of vision, commonly to the extent of one third larger or smaller than the mean, their average dimensions could not be easily determined with sure precision. Upwards of a third of a century has passed since Dr. Bowerbank, experimenting with a cobweb micrometer at one of his delightful and instructive entertainments, found a remarkable difference in the size of the red blood-corpuscles obtained from the fingers of three gentlemen among his guests then present together. In the human subject I have often observed similar diversities, though to a less extent than appeared in Dr. Bowerbank's experiments; and I have notes of results to the like effect of observations, long since made by me, on single and on different individuals of one and the same species of all the Vertebrate classes. But such variations (in Man, see further p. 484), whether in a single individual or in different individuals of one species, are confined within such limits as not to prevent good approximations to the truth in the measurements.

It should also be borne in mind that small organisms, even when each of them has a fixed diameter, vary so much among themselves that it would be difficult, if not impossible, to determine with absolute precision their mean dimensions, however easy it may be to measure truly a single blood-disk or a spore of a cryptogam. For example, let any person make trials with several portions of one and the same sample of spores or little seeds of a plant, when the results of numerous true measurements will fail to afford precisely the same average diameter. How, then, can this be expected of objects so variable in size and shape as the red blood-corpuscles? Those of Mammalia, when dried slowly, are apt to become misshapen and more or less irregularly contracted; but when dried instantaneously in single or very thin layers on a glass slide, their form is admirably preserved, and their size is a shade larger than in the wet state, especially when prepared in summer. The pyrenæmatous corpuscles,

on the contrary, are generally somewhat contracted by similar drying. The complete and permanent preservation of their form by drying seems to be a characteristic of the red blood-corpuscles; other soft bodies, such as lymph-corpuscles or pale blood-globules, lose their shape, however carefully dried. Of both kinds of the red corpuscles I have many specimens thus prepared more than a third of a century since, and they are still as beautifully perfect as ever, though they are naked, as at first, on the glass slides, protected only by wrapping paper, and have often travelled about, with military baggage and otherwise, both by sea and land. The blood prepared in this simple manner only requires to be kept dry. And thus it would be easy for voyagers to preserve and bring home specimens of red blood-corpuscles quite suitable for mensuration.

Special circumstances, too, of which we have not yet sufficient knowledge, may affect the value of any series of such measurements as those recorded in these Tables. When a bird is much excited, and the circulation quickened by attempts at its capture in an aviary, the oval figure of its red blood-corpuscles may be more elongated than in the same bird when quietly at rest. In Batrachians and Reptiles the corpuscles are so large as easily to admit of a perception of variations in their size; these I have found surprising in *Proteus* and *Sieboldia*; and my attention was sometimes arrested by like diversities in other Vertebrates at different times or seasons, though not in so many observations and with such notes as would be needful for satisfactory conclusions. But the facts are sufficient to show that exact and extensive investigations are yet necessary on the comparative magnitude of the red corpuscles, and their aggregate proportion to the other parts of the blood, in one and the same animal at different seasons and under various circumstances:—for example, whether minute diversities in the corpuscles may not be found in man at the tropics and frigid zone; in animals at rest and during violent exertion; in hibernating animals during winter and summer; in species subject to periodic increase of temperature, as observed by Dr. Selater in the Python during incubation (Proc. Zool. Soc. 1862, p. 365, and 1870, p. 97); in males and females; in the arterial and venous systems, and in their different parts; also in relation to the ever-varying state of the liquor sanguinis. Such delicate inquiries, indeed, would require much care and labour, but might be rewarded with valuable results. Pathological or septic changes are out of the present question; but to it belongs the fact that in a single healthy species the corpuscles are so prone to minute variations of size that of these no two observers, or even one observer, can be certain of obtaining precisely the same average measurements.

No wonder, then, that those obtained by such an excellent micrographer as Dr. J. J. Woodward (Month. Micros. Journ., Feb. 1875) should not exactly agree with the results recorded by other observers. Nor need errors be suspected in measurements which differ little more than the objects measured, and which differences, though limited in degree, are sufficient to prevent an exact concordance in divers observations, especially as regards the mean sizes of the blood-disks.

Considering therefore all the fore-mentioned disturbing circumstances, perfect agreement and precision in measurements of the corpuscles, and deductions of completely unexceptional averages therefrom, by various observers, or even by one observer, will appear hopeless. Accordingly, as already hinted, my Tables cannot pretend to absolute exactness, and are only offered for what they may be worth; and in the estimation of their value, allowance should be made for errors, whether instrumental or personal, more or less inevitable, notwithstanding the greatest care, in observations so extensive.

But the relative value of the measurements, though probably not unexceptionable, may be entitled to more confidence as fair approximations to the truth. They were all made by me, under the same conditions and by the same means as described in former papers; and by any valid micrometry, in spite of little mistakes or of variations in the dimensions of the corpuscles of this or that species, the comparative results will appear sufficiently uniform. Thus, if we compare the red blood-corpuscles of species of one order or family, *e.g.* Tragules and other Ruminants, the corpuscles in the former animals will constantly prove the smallest—so, too, in *Paradoxurus* and *Canis*, in *Hippopotamus* and *Elephas*, in *Mus* and *Hydrochærus*, in *Dasypus villosus* and *Orycteropus capensis*, in *Rhea americana* and *Casuarus javanicus*, in *Zootica vivipara* and *Anguis fragilis*, in *Bufo viridis* and *Bufo vulgaris*, in *Osmerus eperlanus* and *Salmo salar*. And in like manner the facts are equally clear in a comparison of the different orders; so that the corpuscles are smaller in Ruminantia than in Rodentia, in Marsupialia than in Edentata, in Granivoræ than in Rapaces, in Anura than in Urodela, in Sturiones than in Plagiostomi.

#### PYRENÆMATOUS VERTEBRATES.

In every animal, without any known exception, of this great division the red blood-corpuscle is characterized by the presence of a nucleus, which is plainly demonstrable in the majority of the corpuscles when examined on the object-plate under the microscope. Nor is the taxonomic value of this fact at all affected by the old and still vexed question, as to whether the nucleus exists distinctly or at all in the corpuscle while it circulates within the living blood-vessels, or is formed only after its exposure to the atmosphere or chemical reagents. Many years ago De Blainville, Valentin, Henle, and others, and more recently Savory, supported the latter view; and the former was adopted by Mayer and Kölliker, to which Brunke has lately conformed. The subject cannot be entertained here; only it may be noted that I have satisfied myself of the substantial accuracy of Mr. Savory's observations on the blood-disks of some British Batrachians, but not of the validity of his conclusion therefrom, and that I have plainly seen in certain fishes the projections on the corpuscles, indicative of a nucleus, while they were flowing within the living blood-vessels.

In Pyrenæmata the thickness of each of the red blood-corpuscles is commonly about one third of its short diameter; they are oval,

except in the Lampreys; largest in the tailed Batrachians and *Lepidosiren*; and then follow, in the order of the size of the corpuscles, Rays and Sharks, Frogs and Toads, Reptiles, Birds, and osseous Fishes, with certain exceptions, which may be seen in the Tables of Measurements. Among the oval corpuscles, whether in Pyrenæmata or Apyrenæmata, a few may deviate by gradations to the circular shape. Of these terms Pyrenæmata and Apyrenæmata, here applied to the two great sections of the Vertebrate subkingdom, an account is given in my Lectures cited above, also in the second volume of the 'Journal of Anatomy and Physiology,' in the 'Proceedings of the Zoological Society,' Feb. 25, 1862, and in the 'Hunterian Oration,' 1863.

### FISHES.

In no other vertebrate class are the red blood-corpuscles so difficult to measure as in this, wherein they are prone to rapid septic conditions, are singularly delicate in outline and substance, and hence most liable to changes of shape; in all of which points the corpuscles of Fishes contrast remarkably with those of Reptiles and Birds.

*Form of the corpuscles.*—Throughout the Vertebrates this is a disk, like a cake or coin; and hence the term blood-disk; but it is never so thin proportionally as a coin, and in fishes the thickness is about one third of its short diameter. The corpuscles are circular in the Lampreys, as figured with details in the 'Proceedings of the Zoological Society,' Dec. 6, 1870, p. 845; but in all other fishes more or less oval, so far as we yet know. If we consider the short diameter of the corpuscle as 1, the long diameter will usually be between  $1\frac{1}{3}$  and  $1\frac{2}{3}$ ; and the nucleus has much the same figure, and is often nearly or quite globular. But these proportions are variable, since the corpuscles are frequently suboval; and in such cases several of them assume, by gradations, a circular shape, while those of the suboval form predominate. This may be plainly seen, for example, in the Anacanthini, especially a few hours after the death of the fish; and then, in other orders besides that, the corpuscles are apt to present angular, fusiform, lanceolate, crascentic, oat-shaped, and still more irregular forms, all of which commonly exist in the blood of Gadidæ and Clupeidæ obtained from fishmongers. In some Acanthopteri and Malacopteri, as *Scomber*, *Caranx*, *Lophius*, and *Salmo*, and the great Eels of Rodriguez, good examples occur of well-defined oval corpuscles. In the Pike most of them are somewhat pointed at the ends. In the osseous fishes there is generally, but not always, a rounded projection on each broad surface of the corpuscle, caused by the nucleus and a groove between it and the margin of the disk. And in no Pyrenæmata has the regular red corpuscle that concavity, gradually deepening towards the centre (Plate LV. fig. 2), which is characteristic of the regular corpuscle in Apyrenæmata, and has often been mistaken for a nucleus.

*Size of the corpuscles.*—In the osseous fishes the largest corpuscles are those of the Salmonidæ, as figured in the 'Proceedings of the Zoological Society,' Nov. 19, 1872, p. 835; but though this largeness is plain in *Salmo*, *Trutta*, and *Thymallus*, it disappears in

*Osmerus*, in which the corpuscles are much smaller than in certain Apodes. The smallest corpuscles occur in some of the little species of Acanthopteri and Anacanthini, and in the Sprat and Herring, while their congener the Pilchard has slightly larger corpuscles. They are somewhat larger in the river-Eels than in the Conger. In no single order of fishes are the corpuscles twice as large in one species as in another; they are quite as large in the osseous Salmon as in the cartilaginous Sturgeon, and in the Sharks and Rays so much larger as to adumbrate a distinct class. *Lepidosiren* has the corpuscles of such still greater magnitude as to depart in this respect from any regular fish to reach the saurobatrachian character.

#### BATRACHIANS.

*Form and size of the corpuscles.*—On each broad surface they are generally flat or somewhat vaulted; and their outline is regularly a well-defined oval figure, mixed occasionally with a few of a suboval or even circular shape, as indeed is the case among all regularly elliptical blood-disks, though this is rarer in Birds than in the lower classes and in the Camels. In Batrachians, the short diameter of the corpuscle being taken as 1, its long diameter would vary commonly between  $1\frac{1}{2}$  and  $1\frac{3}{4}$ . The thickness of the corpuscle is about one third of its short diameter; and the nucleus may be either subrotund, or more commonly liker in shape to the envelope. The largest red blood-corpuscles of Vertebrates occur in the tailed Batrachians, of which *Amphiuma*, a cauducibranchiate species, has the largest of all, so that these are visible to the naked eye, and the perennibranchiate *Proteus* the next in size; and in *Sieboldia*, which has deciduous gills, the corpuscles are larger than in *Siredon*, which has permanent gills. In *Amphiuma* and *Proteus* the corpuscles are at least thrice as large as in some Frogs and Toads—an amount of difference of which there is no example either in the class of Birds or Reptiles, though it is exceeded among Apyrenæmata. The corpuscles in the anurous Batrachians are not always bigger than, and sometimes not so long as, in a few reptiles and in some Sharks and Rays. The size of the corpuscles in Batrachians may differ in the same individual at different seasons. A few more observations on the corpuscles in this class are given in the 'Proceedings of the Zoological Society,' Feb. 4, 1873.

#### REPTILES.

*Form and size of the corpuscles.*—They are oval, flattish, little tumid on each broad surface—much of the same shape as, but generally rather longer in proportion to their breadth than, in Batrachians, as is the case, too, in some birds. And as in such elongated shape of the corpuscles in a few species (e. g. *Anguis fragilis* and *Crocodilus lucius*, *Syræna nyctea* and *Columba migratoria*) Reptiles and Birds agree, so they differ from the other classes. Of Reptiles the largest corpuscles occur in some Crocodiles and Tortoises, and the smallest in the little Saurians and larger *Teius* and *Monitor*; the reptilian corpuscles are smaller than those of the batrachian Urodela, but in

a few species longer, and in more smaller than in some of the Anura. Thus in most Tortoises and Crocodiles and the Slow-worm the corpuscles are longer than, though not so broad as, in the Green Tree-Frog and in some exotic Toads, but are smaller in *Python*, *Teius*, *Zootica*, *Lacerta*, *Plestiodon*, and *Iguana tuberculata* than in any Batrachians; and of this *Iguana*, which has the smallest known reptilian corpuscles, it is remarkable how much smaller they are than those of *Iguana cyclura*. Nor are the corpuscles in Reptiles, though regularly larger than in Birds and Osseous Fishes, ever quite so large as in Rays and Sharks; and in some Ophidians and Saurians the corpuscles are smaller than in certain Salmonidæ. There is more uniformity of the corpuscles throughout the class of Reptiles than in some single orders of Apyrenæmata; in no Reptile are the corpuscles twice the size of those in other reptiles, and the corpuscles are oval in every species. Here, again, there is a conformity of Birds to Reptiles, and a divergence of both these classes from Mammalia, each of those pyrenæmatous groups being in these respects more like an order than the class of Apyrenæmata. But Reptiles, unlike Birds, present no relation between the size of the corpuscles and that of the species; they are as large in the little Viper and Snake as in the huge Pythons and Boa, and in the small *Anguis* and *Chamæleon* as in the large *Teius* and *Monitor*. Differences in the size of the corpuscles probably occur at certain seasons.

#### BIRDS.

*Form and size of the corpuscles.*—They are oval in all birds, generally flat, with a slight tendency to be gibbous on the broad surfaces, altogether of much the same shape as in reptiles; taking the short diameter of the avian corpuscles as unity, the long diameter would usually vary between  $1\frac{1}{2}$  and 2. But, as in Reptiles so in Birds, there are remarkable deviations from the regular proportions; thus, *e. g.*, in *Columba migratoria* (fig. 60), *Lanius excubitor* (fig. 56), and *Syræna nyctea* (fig. 58) the length exceeds twice the breadth of the corpuscles, while in *Columba rufina* (fig. 59) and a few more pigeons, *Dolichonyx oryzivorus* (fig. 61), in species of *Loxia* and certain other Granivoræ, the corpuscles have a much shorter oval figure. A mere glance at the Tables of Measurements will show how nearly the short diameters of the blood-disks of Birds agree with the diameters of the blood-disks in Apyrenæmata; so that there is no bird in which such coincidence with some mammals is not obvious.

Regularly the nucleus is more oblong than the entire corpuscle, so that the length of the nucleus is about twice, and occasionally nearly or quite thrice, its breadth. Hence this elongated shape exceeds that of the corresponding nucleus of other Pyrenæmata, and is characteristic of Birds; but there are exceptions, as may be seen in some gallinaceous species, in which the nucleus is suboval or nearly globular.

Though in Birds the red corpuscles are regularly smaller than those of Reptiles, a few exceptions occur; for example, the corpuscles are quite as large in the Cassowaries as in certain Saurians. And while

Birds almost always have the corpuscles larger than those of Mammalia, here, too, are a few irregularities, as will appear on a comparison of the corpuscles of *Linaria*, *Dolichonyx* (fig. 61), and *Trochilus* (fig. 66) with the largest apyrenæmatous corpuscles (figs. 14, 23, and 47). In Birds the largest corpuscles belong to the Cursores (fig. 53), the next in size to the Rapaces (fig. 58), Palmipedes (fig. 65), Grallatores, and the Hornbill (fig. 62); the smallest corpuscles occur in some of the little Granivoræ (fig. 61) and Insectivoræ, in the Humming-bird (fig. 66) and other Anisodactyli. Throughout the class of Birds there is so far a relation between the size of the species and the size of the corpuscles, that no instance is known of the largest corpuscles in the small species, or the smallest corpuscles in the large species. And herein this entire class rather resembles an order or family than the class of Mammalia; and so, too, as regards the constant oval figure of the avian corpuscles. In some single apyrenæmatous orders there are greater diversities in the size, and in a few instances in the shape, of the corpuscles than in the entire class either of Birds or Reptiles; in neither of these two pyrenæmatous classes is there any exception to the elliptical form of the corpuscles, nor are the corpuscles ever twice as large in one species as in another of the same class.

#### APYRENÆMATOUS VERTEBRATES.

As already described, in all the oviparous or pyrenæmatous Vertebrates there is a nucleus distinctly demonstrable in the red corpuscles. And now we come to the Mammalia or Apyrenæmata, in which, on the contrary, no such nuclei can be made visible by the very same treatment which plainly displays them in the Pyrenæmata; that is to say, a nucleus cannot be disclosed in the majority of the red blood-corpuscles of Apyrenæmata. The oval blood-disks of the Camels (figs. 37-41) conform in this respect, and in smallness of size, to the circular corpuscles of other Apyrenæmata; in no pyrenæmatous vertebrate are the corpuscles so small as in the Camels. Of course we are not dealing now with the large temporary red corpuscles which have nuclei in the early mammalian embryo, nor with phases of development and decay in the adult, but with the majority of the regular corpuscles. Neither are we concerned with Mr. Wharton Jones's valid doctrine as to their origin, nor with any speculations as to their real nature. So far as is yet known this is peculiar; for the free apyrenæmatous corpuscles have no known homologue, and are devoid of the true characters of nuclei.

*Form of the corpuscles.*—This is regularly a circular biconcave disk (figs. 1 and 2), the concavities very shallow and deepening towards the centre; and this is characteristic of Apyrenæmata. At the circumference the thickness is between a third and a fourth of the diameter of the corpuscle. But a body so soft, so readily affected by osmosis and other causes, is liable to assume many odd shapes which may be seen to occur during the examination. Thus appear such forms as plano-convex, biconvex, crenate, puckered, granulated, dented, cup-shaped, and several others. Sometimes their circum-



ference is swollen, so as to produce triangular, oval, or formless pits towards the centre. In the Tables of Measurements only the regular blood-disks are noted. Of the Apyrenæmata the Camels (figs. 37-41) alone have oval red blood-corpuscles; but these, as before mentioned, conform in all other respects to the apyrenæmatous type; and a few subrotund or circular disks may occur among the prevailing oval ones. In some Cervidæ the corpuscles (fig. 42) assume fusiform, lanceolate, crescentic, and irregularly polygonal and other angular forms, as originally figured on page 329 of the 'London and Edinburgh Philosophical Magazine,' Nov. 1840; but with these are mixed a few red corpuscles of the usual circularity, which only were measured for the Tables.

*Size of the corpuscles.*—They are the smallest in the vertebrate subkingdom; and the smallest of all occur in the Ruminants (figs. 29-34), especially in the Tragulidæ (figs. 29-31); and thus this family may be distinguished from all other Vertebrates, not even excepting *Moschus* (Proc. Zool. Soc., Feb. 10, 1870, fig. 2), which was formerly confounded with *Tragulus*, and of which the anatomy has been described by Professor Flower in the 'Proc. Zool. Soc.' March 16, 1875. Comparative views of the corpuscles of these two genera are engraved to a scale in the same 'Proceedings,' Feb. 10, 1870. Since then, using Powell and Lealand's  $\frac{1}{16}$  objective, I could detect no difference between these red blood-corpuscles of *Moschus moschiferus* and *Cervus nemorivagus* (fig. 32), while the comparative smallness of those of *Tragulus* (figs. 29-31) was remarkable and significant. The largest corpuscles in the class belong to the Elephants (fig. 23), great Edentates (fig. 47), and pinniped Feræ (fig. 14); in some of which, as the Walrus (fig. 14), the Elephants (fig. 23), the Great Anteater (fig. 47), the Two-toed Sloth (fig. 48), and the Ardvark (Proc. Zool. Soc., Feb. 10, 1870, fig. 4), the corpuscles are as large as in a few Birds (figs. 61 and 66). The Monotremata (fig. 52), Marsupialia (figs. 50 and 51), and Rodentia (figs. 43-46) have somewhat large corpuscles, which in some Cetacea (fig. 20) are larger. Sometimes two sets of corpuscles occur in nearly equal proportions, one set about a third smaller than the other; this fact, though rare in most mammals, is not uncommon in the Squirrels. Of the Pachydermata the Elephants alone have the corpuscles larger than those of Man, and the smallest occur in the Horse (fig. 26); their comparative largeness in such a small species as *Hyrax* (fig. 28) proclaims it, though arranged here, but an irregular member of this order.

In the Feræ or Carnivora there are great irregularities: while some of the largest apyrenæmatous corpuscles occur in this order, they are in many of its species smaller than in several Ruminantia. The families of Carnivora, according to the sizes of their red blood-corpuscles, would stand thus:—Seals (fig. 14), Dogs (fig. 15), Bears (fig. 11), Weasels (fig. 16), Cats (fig. 17), Viverras, Paradoxures (figs. 18 and 19). These sizes differ so much that by them alone Seals or Dogs may be easily distinguished from Viverras or Paradoxures; while the same kind of diagnosis would be difficult, unless under the most favourable circumstances, and in some cases impos-

sible, between members of the first two families and Man. In the largeness of the corpuscles the Hyænas are more like Dogs than Viverras. The Fox has the corpuscles smaller than those of the common Dog and Dingo (fig. 15). *Cercoleptes* (fig. 13) in the smallness of the corpuscles resembles a *Viverra*, thus hardly appearing to be a regular member of Plantigrada or Ursidæ; but, on the other hand, I have found the muscular sheath of the œsophagus (Proc. Zool. Soc., May 12, 1870) of *Cercoleptes* more like that of a Bear than of a Civet. *Bassaris* (fig. 12) in the size of its corpuscles agrees with the Ursidæ and differs from the Viverridæ. Of the Insectivora (fig. 10), excepting the curious and surprising deviation in *Sorex indicus*, the corpuscles are somewhat smaller than those of Plantigrada (fig. 11). In that species the corpuscles are hardly, if at all, distinguishable from those of Man, as was shown to me by my son, who brought the blood from the Mauritius. In that country this Shrew is called the Musk-Rat, and, as it is very common, the fact of the size of its red blood-corpuscles might become one of the many objections to the identification by micrometry of human blood-stains. In the Bats (figs. 7-9) the corpuscles are just appreciably larger in the frugivorous than in the insectivorous species. In the Monkeys (figs. 4 and 5) the corpuscles are somewhat larger still, with a tendency to a diminution of size in the Lemurs (fig. 6), but generally so nearly approaching in the higher species to the human corpuscles as to be scarcely distinguishable therefrom.

In Man (figs. 1 and 2) the red blood-corpuscles are not always distinguishable from those of the Dog, but are regularly larger than in any British land Mammals, and are not known to be exceeded in size in more than eight or nine foreign species of this class, though closely approximated, or even surpassed, in some Marsupials, Edentates, Rodents, Cetaceans, Feræ, and most Monkeys. As before noticed (p. 476), the magnitude of the corpuscles in a single species, not excepting the human, is liable to variations within certain limits; and there commonly appear in one field of vision of the same corpuscles differences amounting to at least one third larger and smaller than the average. Hence as regards the medico-legal question, however truly a careful observer (Dr. Joseph G. Richardson, Month. Micros. Journ., Sept. 1874) may have distinguished, by comparative measurements of the corpuscles, stains of human blood from those of the Sheep or Ox, this kind of diagnosis, as Dr. J. J. Woodward observes (Month. Micros. Journ., Feb. 1875), would be ineffectual in some probable and more possible cases (see before at p. 477). It should be borne in mind, too, that in the Apyrenamata the membranous bases (fig. 3) of the blood-disks, when deprived of their colour by maceration in water, are about a third smaller than the unaltered corpuscles.

Much larger red blood-corpuscles than those of the human species may be expected in the most gigantic marine Feræ and Cetacea. The largeness of the corpuscles in *Orycteropus* was truly predicted long before they were ever examined; and we may well suppose that they were larger in the huge extinct Edentates than in any existing

Mammal. It would be very interesting and probably instructive to examine the corpuscles of the Sirenia.

Reverting summarily to a few points throughout the whole apyrenæmatous class, we shall find several plain facts which, though long since demonstrated, are still ignored in the current treatises of comparative anatomy and histology. For example, while the smallest corpuscles occur in the Ruminants, there are some species of this order in which the corpuscles are larger than in certain Feræ; the Edentates, on the other hand, are eminently characterized by the largeness of the corpuscles; commonly the diameters of the apyrenæmatous corpuscles agree remarkably with the short diameters of the corpuscles in Birds. The corpuscles in a few Apyrenæmata are five times as large as in others; and even in the single order of Ruminants the corpuscles, besides aberrations in their shape, are thrice as large in several Cervidæ and Bovidæ (fig. 35) as in some Tragulidæ (figs. 29 and 30). In the Feræ the corpuscles are more than twice as large in some species as in others, in this order the largest corpuscles (fig. 14) being larger than those of Man (fig. 1), and the smallest (figs. 18 and 19) smaller than in some Ruminants (figs. 35 and 36). Hence, on the whole, there are greater diversities in the size of the corpuscles than in any other class; so that in this point of view a single apyrenæmatous order would appear equal to an entire class either of Birds or Reptiles, and each of these two pyrenæmatous classes only equivalent to an order of Mammalia. But comparing the largest with the smallest batrachian corpuscles, and those of *Lepidosiren* and some Rays and Sharks with the smallest corpuscles in osseous fishes, differences of size appear almost or quite as great as in Apyrenæmata.

From this class selections might be and have been made to show that there is no relation between the size of the species and the size of the corpuscles. These are quite as large in the tiny Harvest-Mouse (fig. 46) and Shrew (fig. 10) as in the great Giraffe (fig. 36) and Horse (fig. 26). But if, instead of thus comparing such widely different animals, and excepting some little irregularities already noticed, we confine the observations to small natural groups of the class, such a relation will plainly appear in a rule that the largest corpuscles occur in the large species and the smallest corpuscles in the small species of a single order or family. This relation is well shown by the Ruminants, Rodents, and Edentates; and even in the Feræ, which offer some exceptions, the largest corpuscles are found in the big Seals (fig. 14), and the smallest corpuscles in the little Viverras and Paradoxures (figs. 18 and 19). In fine, though this rule is applicable only to single orders or lower sections of Apyrenæmata, it extends to the whole class of Birds, but neither to Reptiles, Batrachians, nor Fishes, except in some partial instances, which seem to be rather indeterminate or accidental than regular.

In the following Tables the measurements are all in vulgar fractions of an English inch, and express only the average diameters of the red blood-corpuscles or their nuclei. The numerator, being invariably 1,

is omitted throughout, and the denominators only are printed. Of the corpuscles the long diameter is denoted by L.D., the short diameter by S.D., and the thickness by T.

## VERTEBRATA PYRENÆMATA.

## PISCES.

CYCLOSTOMI.		L.D. S.D.	
Petromyzon fluviatilis. ....	2134	Cyprinus rutilus. ....	2133 3000
	T. 6200	" phoxinus. ....	2000 2900
	Nucleus .... 6400	" cephalus. ....	2133 3555
" marinus. ....	2134	" gobio. ....	2133 2900
" planeri. ....	2134		
Ammocetes branchialis. ....	2134	ANACANTHINI.	
MALACOPTERI.		Gadus morrhua. ....	2133 3555
		" aeglefinus. ....	2460 3200
<i>Apodes.</i>	L.D. S.D.	" luscus. ....	2460 3200
Gymnotus electricus. .	1745 2599	Merlangus carbonarius. .	2133 3000
Anguilla vulgaris. ....	1745 2842	" vulgaris. .	2460 3555
" marmorata. .	1895 2900	Merluccius vulgaris. .	2133 3000
" amblyodon. .	1777 3000	Motella mustela. ....	2400 3200
Conger vulgaris. ....	2286 3000	Platessa flesus. ....	2666 3000
Ammodytes lancea. ....	2000 3555	" vulgaris. ....	2666 3000
		" limanda. ....	2900 3200
<i>Abdominales.</i>		Pleuronectes rhombus. .	2460 3200
Clupea sprattus. ....	2666 3555	Solea vulgaris. ....	2400 3200
" harengus. ....	2666 3555		
" alba. ....	2666 3555	ACANTHOPTERI.	
" pilchardus. ....	2286 3200	Perca fluviatilis. ....	2000 2824
Engraulis encrasicolus. .	2286 3000		T. 8700
Alosa finta. ....	2286 3000		Nucleus 7482 8830
	T. 8888	" marina. ....	2960 4000
Salmo salar. ....	1524 2460	" labrax. ....	2666 3200
" ferox. ....	1524 2900	" cernua. ....	2461 3000
" fario. ....	1524 2900		T. 8000
	T. 8000		Nucleus 6000 8000
" fontinalis. ....	1455 2286	Dules, sp. ....	2400 2900
Thymallus vulgaris. .	1684 2900	Sparus centrodontus. .	2286 3200
Osmerus eperlanus. ....	2286 3000	Mullus surmuletus. ....	2286 3000
	T. 8888	" barbatus. ....	2286 3200
	Nucleus 6400 8888	Trachinus draco. ....	2400 3000
Esox lucius. ....	2000 3555	Mugil capito. ....	2400 3200
	Nucleus 5333 8000	Scomber scomber. ....	2286 3200
Belone vulgaris. ....	2286 3000	Thynnus communis. .	1600 2666
Cobitis barbatula. ....	2286 3200	" pylauides. ....	2000 3000
Cyprinus carpio. ....	2142 3429	Zeus faber. ....	2000 2666
	T. 8000	Caranx trachurus. ....	2000 3555
	Nucleus 6400 8000	Xyphias gladius. ....	2461 4008
" tinca. ....	1895 2400	Trigla hirundo. ....	2666 3555
	T. 8000	" cuculus. ....	2460 3200
	Nucleus 8000 9600	" gurnardus. ....	2286 3000
" auratus. ....	1777 2824	Cottus gobio. ....	2000 2900
	T. 10666		T. 8000
" brama. ....	2400 3555	" bubalis. ....	2000 2900
" erythrophthal-		" scorpius. ....	2000 2900
mus. ....	2000 3200	Gasterosteus leiurus. .	2666 3000

	L.D.	S.D.
Gasterosteus pungitius	2666	3000
Gunellus vulgaris	2460	3000
Blennius pholis	2460	3000
Callionymus lyra	2286	3000
Lophius piscatorius	1895	2666
T. 8000		
Cyclopterus lumpus	2000	2666
LOPHOBRANCHII.		
Syngnathus typhle	2286	2666
PLECTOGNATHI.		
Diodon, sp.	2286	3000
GANOIDEI.		
Acipenser sturio	1600	2666
PLAGIOSTOMI.		
<i>Selachii.</i>		
Spinax acanthias	1148	1600
Nucleus	3000	4000
Fœtus	1000	1333

	L.D.	S.D.
Squalus centrina	800	1000
Scyllium canicula	1000	1542
Nucleus	3000	4000
„ stellaris	1000	1777
Zygæma, sp.	1185	1777
Lamna cornubica	923	1500
Mustela lævis	1090	1500
Squatina angelus	1032	1455
Fœtus	1000	1333

*Batides.*

Torpedo oculata	800	1000
Raja batis	970	1455
„ clavata	1090	1600

## PROTOPTERI.

Lepidosiren annectens.	570	941
Nucleus	1455	2900

## BATRACHIA.

Amphiuma tridactylum	363	615
Nucleus	1143	2000
Proteus anguinus	400	727
Nucleus	1600	2666
Siren lacertina	420	760
Nucleus	1142	2007
Menopoma alleghaniense	563	1000
Nucleus	1333	2286
Siredon humboldtii	571	1000
Nucleus	2000	3000
Sieboldia maxima	450	800
Triton bibronii	848	1280
Nucleus	1901	3000
„ cristatus	848	1280

Lissotriton punctatus	800	1280
Nucleus	1778	2667
Rana temporaria	1108	1821
T. 7112		
Nucleus	3114	6297
„ Tadpole ( $\frac{1}{2}$ in. long)	1098	1650
„ esculenta	1000	1445
Hyla viridis	1391	1895
Pelodytes æræuleus	1280	2000
Bufo vulgaris	1043	2000
T. 5627		
Nucleus	2802	5261
„ viridis	1333	1895
„ calamita	1333	1895
Bombinator igneus	1333	1895

## REPTILIA.

OPHIDIA.		
Coluber berus	1274	1800
Nucleus	3227	4986
Heterodon madagascariensis	1455	2460
Coronella phocaenæ	1455	2286
Eryx johnii	1455	2286
Natrix torquata	1371	2157
T. 8341		
Nucleus	3835	6817
Boa constrictor	1440	2400
Python sebae	1440	2400
„ regius	1440	2400
„ tigris	1440	2400
Nucleus	3555	7468

Morelia (?) spilotes	1545	2400
„ argus	1371	1685
Cœlopeltis lacertina	1500	2400
Chilobothrus inornatus	1391	2286

## SAURIA.

Anguis fragilis	1231	2666
Eumeces australis	1524	2666
Pseudopus pallasii	1524	2460
Zootoca vivipara	1600	2460
Lacerta viridis	1555	2743
Teius teguixin	1455	2666
Monitor niloticus	1524	2666
Iguana tuberculata	1600	2900
„ cyclura	1230	2285
Nucleus	5333	6400

	L.D.	S.D.
Chamaeleon vulgaris ..	1391	2400
Gecko ———? .....	1333	2133
Trachidosaurus rugosus	1391	2900
Plestiodon auratus....	1455	2400
Champsia fissipes ....	1259	2315
Alligator ———? .....	1324	2122
Crocodylus acutus ....	1231	2286
T. 8000		
"      lucius ....	1124	2215

## CHELONIA.

Emys caspica .....	1143	2000
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	L.D.	S.D.
Emys trijuga .....	1333	1909
Chelonia mydas .....	1231	1882
Nucleus	4000	6000
Testudo graeca .....	1252	2216
"      radiata .....	1241	2197
"      mauritanica ..	1280	2000
"      tabulata ....	1143	2000
Gymnopodus aegypti-		
acus .....	1143	2000

## AVES.

## PALMIPEDES.

Phalacrocorax carbo..	2005	3765
Pelecanus onocrotalus	1777	3369
Nucleus	3200	9600
Larus ridibundus ....	2097	4000
"      canus .....	1973	3839
Nucleus	3555	10666
Somateria mollissima.	2000	3200
Anas galericulata ....	1937	3424
Querquedula crecca ..	2062	4592
"      acuta ..	1993	3839
"      circia ..	2088	3839
Mareca penelope ....	1873	4385
Tadorna vulpanser ..	1925	3839
Dendronessa sponsa ..	2001	4079
Dendrocygna viduata.	1789	3555
"      autum-		
nalis.	1916	3764
"      arborea.	1931	3724
Cygnus atratus .....	1806	3692
Bernicla magellanica..	1866	3839
"      sandivensis..	1866	3839
Cereopsis novæ hol-		
landiæ .....	1722	3692
Chenalopex aegyptiaca	1866	3839

## PINNATIPEDES.

Podiceps minor ....	2001	3200
Fulica atra .....	1895	3200

## GRALLATORES.

Gallinula chlorophus .	2055	3839
"      porzana ..	2000	3555
Rallus philippinensis.	2097	3389
Scolopax gallinago ..	2170	3622
Limosa melanura ....	1937	3764
Numenius phaeops ..	1846	4465
Ibis ruber .....	1948	3153
Platalea leucorodia ..	1859	3600
Ciconia alba .....	1755	3439
"      nigra .....	1806	3403

Ciconia argala .....	1728	3555
"      marabou ....	1859	3460
Ardea cinerea .....	1913	3491
"      nycticorax....	1780	3555
"      minuta .....	1993	3827
Balearica regulorum..	1858	3478
"      pavonina ..	1859	3777
T. 9597		
Nucleus	4000	9750
Anthropoides virgo ..	1884	3740
T. 11230		
"      stanleyanus	1909	3529
Psophia crepitans....	1883	3488
Hæmatophus ostrale-		
gus .....	1895	4000
Nucleus	3200	9000
Vanellus cristatus ..	1964	3310
Edicnemus crepitans.	2157	4000
Dicholophus cristatus.	1884	3364

## CURSORES.

Otis tarda .....	1811	3200
"      houbara.....	1811	3200
Casuarus emu .....	1455	2800
"      javanicus..	1455	2800
Dromaius novæ hol-		
landiæ .....	1690	3031
Rhea americana ....	1898	3273
Strauthio camelus ....	1649	3000
T. 9166		
Nucleus	3200	9166

## GALLINÆ.

Tinamus rufescens ..	1752	3338
Tetrao urogallus ....	2248	3836
"      tetrix .....	2376	3728
"      caucasica ....	1923	3456
Nucleus	4570	9166
Ortyx virginianus ..	2213	4000
"      neoxenus ....	2305	3836
Coturnix argoondah..	2347	3470

	L.D.	S.D.
<i>Perdix longirostris</i> ..	2054	3801
" <i>bonhami</i> ....	1933	3282
Nucleus	4570	10666
<i>Francolinus vulgaris</i> .	2106	4041
<i>Numida rendalli</i> ....	2054	4415
<i>Meleagris gallopavo</i> ..	2045	3598
<i>Gallus domesticus</i> ..	2102	3466
Nucleus	6400	8000
<i>Phasianus pictus</i> ....	2213	3615
" <i>nycthemerus</i>	1887	3470
Nucleus	4000	8000
" <i>superbus</i> ..	2128	3587
" <i>lineatus</i> ..	1855	3488
Nucleus	4570	9166
" <i>colchicus</i> ..	2168	3646
Nucleus	5647	7111
<i>Pavo cristatus</i> .....	1835	3589
" <i>muticus</i> .....	1835	3589
" <i>javanicus</i> .....	1884	3491
<i>Ourax mitu</i> .....	2005	3490
<i>Crax globicera</i> .....	1985	3425
" <i>rubra</i> .....	1993	3664
" <i>yarrellii</i> .....	2000	3456
<i>Penelope cristata</i> ....	1902	3607
" <i>leucolophus</i>	1902	3607
Nucleus	3555	9166

## COLUMBÆ.

<i>Columba mystacea</i> ..	2100	3512
" <i>leucocephala</i>	2132	3646
" <i>coronata</i> ..	1954	3491
" <i>migratoria</i> ..	1909	4626
" <i>zenaida</i> ....	2203	3571
" <i>montana</i> ..	2239	3692
Nucleus	5333	12000
" <i>aurita</i> ....	2322	3519
" <i>corensis</i> ....	2193	3643
" <i>guinea</i> ....	2165	3839
" <i>nicobarica</i> ..	2133	3692
" <i>chalcoptera</i> ..	2208	4062
" <i>rufina</i> ....	2314	3429
" <i>tigrina</i> ....	2088	3615
" <i>turtur</i> ....	2005	3369
" <i>risoria</i> ....	2133	3523
" <i>palumbus</i> ..	1973	3643

## CHELIDONES.

<i>Cypselus apus</i> .....	1982	3850
Nucleus	4000	10666
<i>Hirundo rustica</i> ....	2133	4000
Nucleus	4570	8000
" <i>urbica</i> .....	2170	4000
<i>Podargus cuvieri</i> ....	1834	3200

## ALCYONES.

<i>Alcedo ispida</i> .....	2124	3693
<i>Halcyon gigantea</i> ....	2110	3555

## ANISODACTYLLI.

	L.D.	S.D.
<i>Certhia familiaris</i> ....	2305	4000
<i>Sitta europæa</i> .....	2213	4188
Nucleus	4572	11000
<i>Trochilus</i> , sp. ....	2660	4000

## ZYGODACTYLLI.

<i>Picus minor</i> .....	2170	3892
<i>Psittacula pullaria</i> ..	2097	4174
" <i>cana</i> ....	2101	4174
<i>Psittacus mitratus</i> ..	2029	3892
" <i>melanocephalus</i> ..	2005	3892
" <i>menstruus</i> ..	2115	3708
" <i>badiceps</i> ..	2165	3617
" <i>leucocephalus</i> .....	2050	3727
" <i>amazonicus</i> ..	1800	3832
" <i>dufresnii</i> ..	2278	3374
" <i>regulus</i> ....	2037	3764
" <i>americanus</i> ..	2115	3600
" <i>augustus</i> ..	2085	3606
" <i>albifrons</i> ..	1931	3692
" <i>erithacus</i> ..	1898	4000
<i>Tanygnathus macro-</i> <i>rhynchus</i> .....	2106	3829
<i>Lorius domicellus</i> ..	2093	4133
" <i>ceramensis</i> ..	2115	4000
" <i>amboynensis</i> ..	2045	4133
" <i>coccineus</i> ....	2165	4000
" <i>sinensis</i> .....	2115	3692
<i>Palæornis alexandri</i> ..	2115	3892
" <i>torquatus</i> ..	2174	3892
" <i>bengalensis</i>	2278	4000
<i>Trichoglossus capistratus</i> .....	2203	3892
<i>Psittacara virescens</i> ..	2097	4175
" <i>solstitialis</i> ..	2133	4000
" <i>viridissima</i>	2029	4190
" <i>patachonica</i>	2155	3977
" <i>murina</i> ....	2133	4031
" <i>leptorhyncha</i> ....	2067	3931
<i>Nymphicus novæ hollandiæ</i> .....	2160	4174
<i>Platycercus niger</i> ....	2133	3892
" <i>scapulatus</i>	2000	4042
" <i>vasa</i> ....	2045	3892
" <i>flaviventris</i>	2118	3892
" <i>eximius</i> ..	2193	3892
" <i>pacificus</i> ..	2118	4174
" <i>pennanti</i> ..	2106	3931
<i>Macrocerus severus</i> ..	2165	3801
" <i>macao</i> ..	1902	4762
" <i>ararauna</i> ..	1961	4128
" <i>illigeri</i> ..	1924	4335

	L.D.	S.D.
Macrocerus aracanga	1902	4041
Plectolophus eos	1981	3728
" sulphureus	2203	3399
" rosaceus	1842	3547
" Nucleus	4000	12000
" galeritus	1880	3600
" philippina-		
rum	1974	4041
Cuculus canorus	2028	3600
Corythaix buffonii	1902	3764

## GRANIVORÆ.

Vidua paradisæa	1998	3740
Nucleus	3555	10666
Loxia malacca	2359	4167
" cærulea	2290	3740
" astrild.	2273	4740
" javensis	2286	3677
" enucleator	2247	4083
" curvirostra	2365	4000
" coccothraustes	2042	3790

T. 9141

Nucleus	4570	10666
Plectrophanes nivalis	2133	4740
Emberiza citrinella	2286	4000
Nucleus	4000	12000
" cristata	2310	4167
Alauda arvensis	2125	4128
Nucleus	4000	12000
Parus cæruleus	2313	4128
" caudatus	2136	4570
Nucleus	4800	10666
" major	2133	3892
Fringilla linaria	2286	4570
" cannabina	2341	3768
" coelebs	2253	4133
" spinus	2140	4000
" chloris	2232	3600
" canaria	2232	3600
" amadava	2243	4800
" carduelis	2243	4800
" cyanea	2144	3741
Pyrgita domestica	2140	3500
Nucleus	4364	9200
" simplex	2273	4000
Amadina fasciata	2001	4364
" punctularia	2133	4133
Cardinalis cucullata	2140	3643
" dominicana	2140	3643
Ploceus textor	2213	4575
Dolichonyx oryzivorus	2400	4167

## INSECTIVORÆ.

Vanga destructor	2019	3892
Lanius excubitor	1989	5325
" collurio	2230	3878

	L.D.	S.D.
Muscicapa grisola	2179	4173
Orpheus polyglottus	2223	3732
" rufus	2231	3646
Merula vulgaris	2097	4256
Nucleus	5333	9140
Turdus canorus	2305	3892
" migratorius	2348	4133
" musicus	2203	4133
Nucleus	4000	9600
" viscivorus	2247	4000
Accentor modularis	2342	4000
Erithacus rubecula	2305	4133
Curruca atricapilla	2359	4133
Philomela lusciniæ	1895	4400
Nucleus	4000	12000
Sylvia phragmites	2003	3550
Motacilla alba	2182	3600
Nucleus	4000	10666
Regulus cristatus	2284	4133
Troglodytes europæus	2359	4133

## OMNIVORÆ.

Buceros rhinoceros	1690	3230
Toccos melanoleucus	2000	3200
Molothrus sericeus	2133	4567
Coracias garrula	2000	3478
Sturnus vulgaris	2115	3892
Nucleus	3764	11333
" prædatorius	3133	4175
Pastor roseus	2106	4630
" cristatellus	2133	4050
" tristis	1993	4167
Fregilus graculus	2106	4505
Gracula religiosa	2075	4167
Corvus corax	1961	4000
" frugilegus	1894	3196
Nucleus	4572	9140
" monedula	2243	4167
Nucleus	4000	10665
" pica	1953	3365
T. 11600		
Nucleus	4245	11138
Nucifraga caryocatactes	1875	4172
Garrulus pileatus	2041	4167
" cristatus	2041	3512
" glandarius	2064	3878
Nucleus	4000	10686
Ampelis garrula	2133	4000
Barita tibicen	2118	3892
Cracticus hypoleucus	2116	4000

## RAPACES.

Strix flammea	1882	3740
Nucleus	4000	10666
" passerina	1885	3555



	L.D.	S.D.		L.D.	S.D.
Bubo maximus .....	1720	3566	Haliaëtus aguiæ ....	1806	3585
„ virginianus ....	1837	4000	Helotarsus typicus ..	1891	3461
Syrnium aluco .....	1930	3801	Aquila chrysaetos ..	1812	3832
„ nebulosum ..	1895	3200	„ bonelli .....	1866	3598
Otus brachyotus ....	1763	4076	„ fucosa .....	1852	3485
„ vulgaris .....	1830	3400	„ choka .....	1830	3691
Surnia nyctea .....	1555	4042	Buteo vulgaris .....	1852	3691
Nucleus .....	3200	10666	„ lagopus .....	1852	3691
Gypogeranus serpenta-			Polyborus vulgaris ..	1829	3572
rius .....	1722	3301	Vultur auricularis ..	1835	3461
Milvus vulgaris ....	1931	3677	Nucleus .....	4000	10666
Falco peregrinus ....	1916	3862	„ fulvus .....	1829	3399
„ tinnunculus ..	1891	3490	T. 9600		
„ subbuteo .....	1827	3507	„ kolbii .....	1794	3337
„ rufipes .....	2000	3790	„ leuconotus ..	1806	3425
„ nisus .....	2000	3555	„ angolensis .....	1684	3166
Nucleus .....	3200	9166	Sarcorhamphus papa..	1825	3600
Haliaëtus albicilla ..	1829	3390	„ gryphus .....	1761	3892
„ leucocephalus ....	1909	3390	Cathartes iota .....	1880	3691
			Gypaëtus barbatus ..	1913	3425

## VERTEBRATA APYRENÆMATA

see

## MAMMALIA.

MONOTREMATA.			Dasyptes sexcinctus .....		3457
Echidna hixtrix .....	3840		„ villosus .....		3315
MARSUPIATA.			Bradypus didactylus .....		2865
Phascolumys wombat ....	3456		„ „ juv. ..		2778
Petaurista sciureus .....	3661		RODENTIA.		
Phalangista vulpina .....	3617		Lepus timidus .....		3560
„ nana .....	3856		„ cuniculus .....		3607
„ fuliginosa ....	3688		Hydrochoerus capybara....		3190
Halmaturus billardieri ....	3623		Cœlogenys subniger .....		3481
Macropus bennettii .....	3535		Dasyprocta aurata .....		3857
„ ocydromus .....	3442		„ acouchi .....		3777
„ giganteus .....	3330		Cavia cobaya .....		3538
„ derbyanus .....	3405		Castor fiber .....		3325
T. 10910			Myopotamus coypus .....		3355
Dendrolagus inustus .....	3450		T. 10667		
Hypsiprymnus setosus ....	4000		Capromys founrieri .....		3483
Perameles lagotis .....	3902		Cercolabes prehensilis ....		3444
Dasyurus viverrinus .. ...	4056		Erethizon dorsatum .....		3380
„ maugei .....	4034		Hystrix cristata .....		3369
„ ursinus .....	3534		Ondatra zibethica .....		3550
T. 10910			Arvicola amphibius .....		3790
Didelphys cancrivora .....	3436		„ riparius .....		4199
„ virginiana .....	3557		Mus giganteus .....		3892
T. 12000			„ decumanus .....		3911
EDENTATA.			„ rattus .....		3754
Myrmecophaga jubata ....	2769		„ musculus .....		3814
Orycteropus capensis .....	2769		„ sylvaticus .....		3839
			„ alexandrinus .....		3900

<i>Mus messorius</i> .....	4268	<i>Capra caucasica</i> .....	7045
<i>Dipus ægyptius</i> .....	4172	" <i>hircus</i> .....	6366
<i>Arctomys prinosus</i> .....	3484	" <i>hircus</i> , var. ....	6430
" <i>empetra</i> .....	3503	<i>Ovis musimon</i> .....	5045
<i>Sciurus vulgaris</i> .....	4000	" <i>aries</i> .....	5300
" <i>niger</i> .....	3841	" <i>tragelaphus</i> .....	6355
" <i>maximus</i> .....	3633	<i>Bos taurus</i> .....	4267
" <i>cinereus</i> .....	4000	" <i>taurus</i> , var. ....	4571
" <i>capistratus</i> .....	3930	" <i>bison</i> .....	4062
" <i>palmarum</i> .....	3847	" <i>urus</i> .....	4070
" <i>listeri</i> .....	3948	" <i>bubalus</i> .....	4586
<i>Pteromys nitidus</i> .....	3777	T. 14000	
" <i>volucella</i> .....	3892	" <i>caffer</i> .....	4703
RUMINANTIA.		" <i>frontalis</i> .....	4299
<i>Auchenia vicugna</i> .. { L.D. 3555		" <i>sylhetanus</i> .....	4222
{ S.D. 6444		PACHYDERMATA.	
" <i>paco</i> .... { L.D. 3361		<i>Sus babyrussa</i> .....	4316
{ S.D. 6294		" <i>scrofa</i> .....	4230
" <i>glama</i> .... { L.D. 3361		<i>Dicotyles torquatus</i> .....	4490
{ S.D. 6294		<i>Tapirus indicus</i> .....	4000
<i>Camelus bactrianus</i> .. { L.D. 3123		<i>Elephas indicus</i> .....	2745
{ S.D. 5876		" <i>africanus</i> .....	2745
{ T. 15210		<i>Hippopotamus amphibius</i> ..	3429
" <i>dromedarius</i> { L.D. 3254		<i>Rhinoceros indicus</i> .....	3765
{ S.D. 5921		<i>Equus caballus</i> .....	4600
{ T. 15337		T. 13422	
<i>Tragulus javanicus</i> .....	12325	" <i>asinus</i> .....	4000
" <i>meminna</i> .....	12325	" <i>burchellii</i> .....	4360
" <i>stanleyanus</i> .....	10825	" <i>hemionus</i> .....	4421
<i>Moschus moschiferus</i> .....	7060	<i>Hyrax capensis</i> .....	3308
<i>Cervus nemorivagus</i> .....	7060	CETACEA.	
" <i>nov. sp.</i> .....	7125	<i>Delphinus phocaena</i> .....	3829
" <i>wapiti</i> .....	4138	" <i>globiceps</i> .....	3200
" <i>hippelaphus</i> .....	3777	<i>Balaena boops</i> .....	3099
" <i>axis</i> .....	5088	CARNIVORA.	
" <i>dama</i> .....	4515	<i>Paradoxurus leucomystax</i> ..	4236
<i>Fætus (5 in. long)</i>	3478	" <i>bondar</i> .....	5633
" <i>alces</i> .....	3938	" <i>typus</i> .....	5633
" <i>barbarus</i> .....	4800	" <i>binotatus</i> .....	4660
" <i>claphus</i> .....	4324	" <i>pallasii</i> .....	5485
" <i>macrurus?</i> .....	5074	<i>Otocyon lalandii</i> .....	3600
" <i>mexicanus</i> .....	5175	<i>Canis familiaris</i> .....	3542
" <i>maral</i> .....	4978	" <i>dingo</i> .....	3395
" <i>porcinus</i> .....	5691	" <i>vulpes</i> .....	4177
" <i>reevesii</i> .....	6330	" <i>bengalensis</i> .....	3338
" <i>capreolus</i> .....	5184	" <i>fulvus</i> .....	3920
" <i>virginianus</i> .....	5036	" <i>argentatus</i> .....	3888
<i>Camelopardalis giraffa</i> .....	4571	" <i>lagopus</i> .....	3888
<i>Antelope cervicapra</i> .....	5108	" <i>cinereo-argentatus</i> ..	3761
" <i>dorcas</i> .....	4922	" <i>aureus</i> .....	3860
T. 16000		T. 14000	
" <i>gnu</i> .....	4800	" <i>mesomelas</i> .....	3645
" <i>sing-sing</i> .....	5150	" <i>lupus</i> .....	3600
" <i>philantomba</i> ....	5116	<i>Lycaon tricolor</i> .....	3891
" <i>picta</i> .....	4875		
" <i>bubalis</i> .....	5600		

<i>Hyæna vulgaris</i> .....	3735
" <i>crocuta</i> .....	3820
<i>Herpestes griseus</i> .....	4062
" <i>javanicus</i> ? .....	4790
" <i>fasciatus</i> .....	4365
" <i>smithii</i> .....	4466
" <i>urinatrix</i> .....	4236
<i>Viverra civetta</i> .....	4274
" <i>tigrina</i> .....	5365
<i>Felis leo</i> .....	4322
" <i>concolor</i> .....	4465
" <i>unicolor</i> .....	4481
" <i>tigris</i> .....	4206
" <i>leopardus</i> .....	4319
" <i>jubata</i> .....	4220
" <i>pardalis</i> .....	4616
" <i>domestica</i> .....	4404
T. 16000	
Fœtus ( $\frac{1}{2}$ in. long) .....	2223
Nucleus .....	4000
" <i>bengalensis</i> .....	4419
" <i>caracal</i> .....	4684
" <i>cervaria</i> .....	4220
" <i>serval</i> .....	4129
<i>Galictis vittata</i> .....	4175
<i>Mustela zorilla</i> .....	4270
" <i>furo</i> .....	4134
" <i>vulgaris</i> .....	4205
" <i>putorius</i> .....	4167
<i>Galera barbata</i> .....	4167
<i>Lutra vulgaris</i> .....	3502
<i>Trichechus rosmarus</i> .....	2769
<i>Phoca vitulina</i> .....	3281
<i>Otaria jubata</i> .....	3000

*Plantigrada.*

<i>Meles vulgaris</i> .....	3940
<i>Arctonyx collaris</i> .....	3609
<i>Ursus maritimus</i> .....	3870
" <i>arctos</i> .....	3723
" <i>americanus</i> .....	3693
" <i>americanus</i> , var. ....	3782
" <i>ferox</i> .....	3530
" <i>lunatus</i> .....	3728
<i>Helarctos malayanus</i> .....	3562
<i>Mellivora capensis</i> .....	3824
<i>Ailuropus fulgens</i> .....	3764
<i>Procyon lotor</i> .....	3950
<i>Nasua fusca</i> .....	3789
" <i>rufa</i> .....	3878
<i>Bassaris astuta</i> .....	4033
<i>Cercopithecus caudivolvulus</i> ..	4573

*Insectivora.*

<i>Talpa europæa</i> .....	4747
<i>Erinaceus europæus</i> .....	4085
<i>Centetes caudatus</i> .....	4085

<i>Sorex tetragonurus</i> .....	4571
" <i>indicus</i> .....	3369

## CHEIROPTERA.

<i>Plecotus auritus</i> .....	4465
<i>Vespertilio murinus</i> .....	4175
" <i>noctula</i> .....	4404
" <i>pipistrellus</i> .....	4324
<i>Cynonycteris collaris</i> .....	3880
<i>Pteropus formosanus</i> .....	4000
" <i>poliocephalus</i> .....	4000
" <i>medius</i> .....	4000

## QUADRUMANA.

*Lemuridæ.*

<i>Loris tardigrada</i> .....	3691
" <i>gracilis</i> .....	3461
<i>Lemur albifrons</i> .....	3976
" <i>catta</i> .....	3892
" <i>anjuanensis</i> .....	4003
" <i>nigrifrons</i> .....	4440

*Simiæ platyrrhini.*

<i>Midas rosalia</i> .....	3510
<i>Iacchus vulgaris</i> .....	3624
<i>Callithrix sciureus</i> .....	3713
<i>Cebus capucinus</i> .....	3454
" <i>apella</i> .....	3467
<i>Ateles belzebuth</i> .....	3589
" <i>ater</i> .....	3602
" <i>subpentadactylus</i> ..	3602

*Simiæ catarrhini.*

<i>Cynocephalus anubis</i> .....	3461
" <i>leucocephalus</i> .....	3555
<i>Macacus radiatus</i> .....	3563
" <i>rhesus</i> .....	3429
" <i>niger</i> .....	3583
" <i>cynomolgus</i> .....	3429
" <i>silenus</i> .....	3430
" <i>nemestrinus</i> .....	3493
" <i>sylvanus</i> .....	3338
" <i>melanotus</i> .....	3389
<i>Cercopithecus maurus</i> .....	3468
" <i>sabæus</i> .....	3342
T. 12000	
" <i>fuliginosus</i> ..	3530
" <i>ruber</i> .....	3395
" <i>pileatus</i> .....	3578
" <i>pyrethrus</i> ..	3401
" <i>petaurista</i> ..	3478
" <i>griseoviridis</i> ..	3429
" <i>æthiops</i> .....	3454
<i>Semnopithecus mona</i> .....	3515
" <i>maurus</i> .....	3515
<i>Hylobates hoolock</i> .....	3368

Hylobates leucogenys . . . .	3425		BIMANA.	
" rafflesii . . . . .	3539	Homo . . . . .		3200
Pithecius satyrus . . . . .	3383		T.	12400
Simia troglodytes . . . . .	3412		Fœtus (5th month)	3000

## EXPLANATIONS OF THE FIGURES ON PLATE LV.

All the objects are red blood-corpuscles done to one and the same scale, which is at the foot of the drawing. The whole length of the scale represents  $\frac{1}{1000}$  of an English inch, and each one of its ten divisions  $\frac{1}{10000}$  of an inch, as described at page 475. Only corpuscles of the average sizes and quite regular shapes are given; and they are all magnified to the same, or nearly the same, degree—to wit, about 800 diameters.

## VERTEBRATA APYRENEMATA.

*Homo.*

1. Corpuscle lying flat.
2. The same on edge.
3. Membranous base of the same, after removal by water of the colouring-matter.

*Quadrumanæ.*

4. Simia troglodytes.
5. Ateles ater.
6. Lemur anguanensis.

*Cheiroptera.*

7. Cynonycteris collaris.
8. Vespertilio noctula.
9. Vespertilio pipistrellus.

*Feræ.*

10. Sorex tetragonurus.
11. Ursus labiatus.
12. Bassaris astuta.
13. Cercoleptes caudivolvulus.
14. Trichechus rosmarus.
15. Canis dingo.
16. Mustela zorilla.
17. Felis tigris.
18. Paradoxurus pallasii.
19. Paradoxurus bondar.

*Cetacea.*

20. Balæna boops.
21. Delphinus globiceps.
22. Delphinus phocæna.

*Pachydermata.*

23. Elephas indicus.
24. Rhinoceros indicus.

25. Tapirus indicus.

26. Equus caballus.

27. Dicotyles torquatus.

28. Hyrax capensis.

*Ruminantia.*

29. Tragulus javanicus.

30. Tragulus memina.

31. Tragulus stanleyanus.

32. Cervus nemorivagus.

33. Capra caucasica.

34. Capra hircus.

35. Bos urus.

36. Camelopardalis giraffa.

37. Auchenia vicugna.

38. Auchenia paco.

39. Auchenia glama.

40. Camelus dromedarius.

41. Camelus bactrianus.

42. Cervus mexicanus (see page 483)

*Rodentia.*

43. Hydrochoerus capybara.

44. Castor fiber.

45. Sciurus cinereus.

46. Mus messorius.

*Edentata.*

47. Myrmecophaga jubata.

48. Bradypus didactylus.

49. Dasypus villosus.

*Marsupialia.*

50. Phascogonys wombat.

51. Hypsiprymnus setosus.

*Monotremata.*

52. Echidna hystrix.

## VERTEBRATA PYRENEMATA.

*Aves.*

53. Struthio camelus.
54. The same, made round and deprived of colour by water.
55. Vanga destructor.
56. Lanius excubitor.
57. Bubo virginianus.
58. Syræa nyctea.

59. Columba rufina.

60. Columba migratoria.

61. Dolichonyx oryzivorus.

62. Bucerus rhinoceros.

63. Psittacus agnatus.

64. Phasianus superbus.

65. Pelecanus onocrotalus.

66. Trochilus, sp.

*Reptilia et Batrachia.*

Gymnotus aegyptiacus.  
 Crocodilus acutus.  
 Lacerta viridis.  
 Anguis fragilis.  
 Coluber berus.  
 Python tigris.  
 Bufo vulgaris.  
 Lissotriton vulgaris.  
 Sieboldia maxima.  
 Siren lacertina.  
 Proteus anguinus.  
 Amphiuma tridactylum.

*Pisces.*

Perca cernua, one corpuscle lying flat,  
 the other on edge.  
 Tinca vulgaris.  
 Salmo fontinalis.  
 Esox lucius.  
 Gymnotus electricus.  
 Squalus acanthias.  
 Ammocetes branchialis.  
 Lepidosiren annectens.

3. On a Change in the Habits of the *Didunculus strigirostris*.

By S. J. WHITMEE, C.M.Z.S., F.R.G.S.

[Received May 31, 1875.]

Two or three months ago, in writing to Mr. Sclater on the *Didunculus strigirostris* of the Samoan Islands (P. Z. S. 1874, p. 183), I mentioned that the bird was evidently increasing in numbers, and I thought this increase might be accounted for by a change in its habits in feeding, roosting, and building. I have long known that it feeds now chiefly (I think I may say almost exclusively) upon high trees, instead of upon the ground as it formerly did. But I did not attribute much importance to that fact, because, the bird being wary, I thought its destruction by wild cats to be chiefly in the night when roosting, or when on the nest during the process of incubation, while rats would also destroy the eggs or young in the nest. Hence I did not see how a change in the place of feeding could alone account for the increase of the bird. I therefore made particular inquiries from natives who shoot birds for me as to its roosting. From the information procured on this point I believe the *Didunculi* almost invariably roost now upon the high branches of trees instead of upon low stumps as formerly.

The nest of this bird is so rarely found that few opportunities occur of learning where it builds. In 1871 I procured an egg which was taken from a nest on the ground; but last year I purchased an unfledged bird which was taken from a nest on a tree; and this morning I have received further information on this point which will, I think, be sufficiently interesting to naturalists to be worth sending. I was asking a native to procure some birds for me, and also to look out for eggs, when he said, "I found an egg of the *Manu-mea* (the native name of the *Didunculus*) the other day and threw it away." To this I replied, "What a pity! Why did you not bring it to me? I would have bought it. What was the egg like? and where was the nest?" He answered, "The egg was white like that of the *Lupe* (the *Carpophaga pacifica*); and the nest was in the fork of a tree. I frightened the bird off, but could not shoot it. The *Manu-mea* seems to build on trees now-a-days; I suppose it is on account

of the wild cats and rats, is it not? It used to make a nest anywhere on the ground formerly, just like a fowl."

This remark about a change in the place of building the nest was given exactly as I have translated it, without any "leading question" on my part, or any remark which could have suggested it; and I have full confidence in the truthfulness of the native who made it.

From my own observation of living *Didunculi*, I think these birds manifest a considerable amount of intelligence: *e.g.* the young one which I procured last year (which I forwarded to Sydney in December last to be transmitted to the Zoological Society of London) very early recognized persons. I caught it one day to transfer it to a large cage. From that time it took a great dislike to me, which was manifested in the most unmistakable manner whenever I approached it. This intelligence seems to have enabled the bird to change its habits for self-preservation. It has probably been frightened when roosting or during incubation by the attacks of cats, and has sought safety in the trees. Learning, from frequent repetition of the fright, that the ground is a dangerous place, it has acquired the habit of building, roosting, and feeding upon the high trees; and this change of habit is now operating for the preservation of this interesting bird, which was a few years ago almost extinct.

Samoa, March 13th, 1874.

#### 4. On the Habits of *Palola viridis*.

By S. J. WHITMEE, C.M.Z.S., F.R.G.S.

[Received May 31, 1875.]

From the article "Helminthology" in the 'Encyclopædia Britannica'\*, I see a notice of this annelid in the 'Proceedings' of the Society for March 9th, 1847. A paper on it has also appeared in vol. xxii. of the Linnean Society's 'Transactions' by Dr. Macdonald. I have not seen either of these papers; but I presume the worm is fully described in them. Very good magnified figures of the head and the posterior extremity of the *Palola* are copied from Dr. Macdonald's paper in the late Dr. Seemann's 'Mission to Viti'†. I shall confine the present paper to an account of the time of the *Palolo's* appearance during several years, and some observations on its habits which I made in 1872 and 1873.

The *Palolo*‡ appears regularly at the time of the moon's last quarter in October and November. I am indebted to the Rev. George Brown, of the Wesleyan Missionary Society (who resided several years at a place on the island of Savaii, where it is very abundant) for the following dates of the worm's appearance:—

1862. Oct. 15th. A small number only.

„ Oct. 16th (day of moon's quartering). *Palolo* plentiful.

\* Enc. Brit. xi. 297.

† Mission to Viti, p. 62.

‡ I employ this form in both the singular and plural number, according to Polynesian usage.

1862. Nov. 14th (day of moon's quartering). Plentiful.  
" Nov. 15th. Plentiful.  
No observations were made in 1863.
1864. Oct. 22nd. None.  
" Oct. 23rd (day of moon's quartering). Palolo obtained,  
but quantity unknown.  
" Oct. 24th. None.  
" Nov. 21st. Very few obtained.  
" Nov. 22nd. None.
1865. Oct. 12th (day of moon's quartering). Abundant.  
" Oct. 13th. Plentiful.  
No observations made in November.
1866. Oct. 31st (day of moon's quartering). A few appeared.  
" Nov. 1st. Plentiful.  
No other observation made this year.
1867. Oct. 21st (day of moon's quartering). Very abundant.  
" Oct. 22nd. None appeared.
1868. Oct. 8th. Plentiful.  
" Oct. 9th (day of moon's quartering). Plentiful.  
" Nov. 8th (day of moon's quartering). Abundant.  
" Nov. 9th. None appeared.

The Palolo is not found at any place within several miles of my residence; and I had no opportunity of visiting a place where it appears until 1872. The moon quartered that year on the 24th October; and on that day the Palolo were expected; but I was at the place on the evening of the 22nd. Two hours before sunrise on October 23rd I went with some natives in a canoe to a part of the reef where they are usually found; but we only obtained a single specimen. During the day I had some blocks of both living and dead coral taken on shore from a spot where the natives said Palolo appeared. These I carefully broke up to search for the worm. As I was breaking one block of dead coral I found a single living Palolo in one of its interstices. This was the only one I found, although I broke several blocks. Before daylight on the morning of the 24th I went out again. About a hundred canoes with natives were already on the spot, and the Palolo were beginning to appear. Putting my hand into the water as my canoe was paddled along, every now and again one of the little creatures passed between my fingers or twined itself about them. Half an hour after reaching the place, they had become so abundant that I could take them up by the handful.

The first point to which I gave my attention was the places where they appeared. I found them thickest in certain spots just on the edge of the reef, and especially in an opening where there was a depth of water of about two fathoms. They were scattered over a considerable surface of the smooth water inside the reef, but only in small quantities, and the number decreased the further I went from the edge of the reef. Over the spot whence I had taken coral blocks for examination on the previous day they were very sparsely distributed.

The next thing I observed was their mode of progression through

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the water. They move rapidly, and with considerable elegance, in a spiral manner, like a screw. The shortest, which were about 6 inches long, had generally two coils, while the longest, which were fully 18 inches long, had as many as five or six coils. The best representation of their appearance I think of is the tendrils of a climbing plant, with a coil to about each three inches of its length. In places where the Palolo were plentiful they seemed to be entangled in an inextricable mass.

The worms were of two colours, green and light brown\*. Taking a green one into the palm of my hand with a little water, I subjected it to slight pressure with my finger, when it broke into pieces of from half an inch to an inch and a half in length, and each piece wriggled about until it subdivided once or twice. From each fracture there immediately flowed out an innumerable quantity of minute green eggs, until nothing was left of the pieces into which the worm had broken except thin transparent cysts. Next, taking one of the light-brown worms into my hand, it ruptured exactly as the green one did, and from each end of the pieces a whitish fluid freely flowed, leaving, as in the green worm, only thin transparent cysts. It was evident these were the two sexes, and that, while the females were filled with ova (a small portion of each extremity excepted), the males were as completely filled with the seminal vesicles.

The question now was, how are the ova of the female fertilized? I saw no sexual contact. But the secret of the appearance of the Palolo seemed solved: by this time the sun had been half an hour above the horizon; and the worms were rapidly breaking to pieces in the sea just as those had broken which I took into my hand. Where they were thickest the sea was discoloured with the milky seminal fluid which was escaping from both ends of each piece of the brown male worms; and by taking a small quantity of sea-water into the palm of my hand, I found it to be full of the minute green eggs which had flowed from the ruptures of the green female Palolo. Hence this breaking-up appeared to be a natural process by which the species is propagated, the eggs being fertilized by contact with the semen while floating in the sea.

I felt fully convinced this was the mode of propagation of the Palolo, and that this fully accounted for its regular appearance, but resolved to wait and make another observation before communicating my opinion to the Society. I therefore visited the same place on the 11th November, 1873, hoping to have another opportunity of seeing

\* In the late Dr. Seemann's 'Mission to Viti,' p. 61, it is said, "They are of various colours, green, red, brown, and sometimes white." Although I have had Palolo brought to me by the natives for several years, I have never seen more than two colours; but some of the brown ones are of a lighter shade than others. I have occasionally found specimens of another annelid, which was red, mixed with a mass of Palolo. When preserved in alcohol or Goatby's solution, the brown worms get stained with the colour of the green ones. Hence the origin of the specific name. As will appear further on, the green colour is confined to the eggs of the gravid female. Hence, except when they are full of eggs, and the brown ones are stained by the green colouring-matter, this name is inappropriate.



the Palolo on the morning of the 12th, when the moon quartered. In this I was not disappointed. They were more abundant this year than they had been the previous one. I confined my attention almost entirely to the contact of the worms with each other, and to their breaking into pieces. Early in the morning I caught three green and three brown ones, and placed them in a large glass vessel which I had provided for the purpose. While observing the worms which were swimming freely in the sea, I also kept my eye upon my captives. I saw no sexual contact either between those in the vessel or those in the sea. They all went gyrating about until a little after sunrise. Then I observed those in the vessel begin to break, first into long pieces, each example separating into two or three parts, while these pieces continued to subdivide into minute portions. I observed those in the sea divided in the same manner and at the same time. This continued till about 8 o'clock A.M., by which time those in the sea had nearly disappeared. The six worms in the vessel were also completely broken up, the water (about half a gallon) being rendered somewhat turbid, as if a dessert-spoonful of milk had been mixed with it. The green ova were floating in all parts of the water, but were gently settling towards the bottom. The empty cysts of the defunct worms were lying on the bottom of the vessel. I brought them home with me, and emptied the whole into a small aquarium, which I am leaving undisturbed to see if the eggs will develop there\*. By the time I reached home, about 1 P.M., all the ova had settled to the bottom of the vessel, notwithstanding the constant agitation of the water by the motion of the boat in which I brought it.

I wish specially to direct attention to the following interesting fact respecting the appearance of the Palolo. Although it comes only at one particular state of the moon (the time of the last quarter), it still keeps solar time in the long run. As far as I have certain information, it has only been seen in October, November, and occasionally, but very rarely, in December. Now it is evident that if the intervals between its appearance were regularly 12 lunations, the months during which it is found would be constantly changing, since it would appear about 11 days earlier each year. If, on the other hand, the intervals were regularly 13 lunations, it would come about 18 days later every year, and the months of its appearance would change still more rapidly.

Having only lately given any attention to this matter, it was with considerable surprise I discovered, from the dates of its appearance, that in each period of three years there are two intervals of 12 lunations each, while in one interval there are 13 lunations. Unfortunately the observations given in the early part of this paper were not all consecutive, so that I cannot say positively that the length of the intervals proceeds in regular order, two years of 12 lunations being invariably followed by one of 13 lunations; but the rule holds good in the aggregate of 12 years over which the observations extend, there being 8 years of 12 lunations each, and 4 years of 13 lunations each. This will appear from the following table, in

\* P.S. They did not develop in the aquarium.—March 17, 1875.

which I include the notice of the appearance of Palolo in Fiji in November 1861, given in Dr. Seemann's work already mentioned.

From Nov. 25th,	1861, to	Nov. 14th,	1862, 12	lunations.
„ Oct. 16th, }	1862, to {	Oct. 23rd,	1864, 25	„
„ Nov. 14th, }		Nov. 21st,		
„ Oct. 23rd,	1864, to	Oct. 12th,	1865, 12	„
„ Oct. 12th,	1865, to	Oct. 31st,	1866, 13	„
„ Oct. 31st,	1866, to	Oct. 21st,	1867, 12	„
„ Oct. 21st,	1867, to	Oct. 9th,	1868, 12	„
„ Oct. 9th,	1868, to	Oct. 24th,	1872, 50	„
„ Oct. 24th, }	1872, to {	Oct. 12th,	1873, 12	„
„ Nov. 22nd, }		Nov. 11th,		

From the above table it appears that either in 1862-1863 or 1863-1864 there were 13 lunations; I believe it was in 1862-1863, for the following reason. If there were only 12 lunations that year, then the Palolo appeared on the 4th of October, 1863, a date earlier than any I have heard of. In the interval between Mr. Brown's observation on Oct. 9th, 1868, and my first observation on Oct. 24th, 1872, there were 50 lunations—2 seasons of 12 lunations each, and 2 of 13 each. I believe the long periods of 13 lunations occurred in 1868-1869 and 1871-1872; for if there were only 12 lunations in these years, then the Palolo appeared on the 28th and 24th of September respectively; and these dates are, according to all our information, too early for the appearance of the worm. Hence I believe the periods of 13 lunations to have been regularly every third year, as follows:—1862-1863, 1865-1866, 1868-1869, and 1871-1872.

But the regular addition of one lunation every third year would still lead to a change in the months of the Palolo's appearance. The 37 lunations of a three years-cycle are rather more than 3 days less than 3 solar years\*. Hence to keep the season from changing from October and November to September and October, &c., an extra lunation would need to be intercalated about every 30 years or rather less†. If this were not done, the season would still change more than

\* The above is a rough estimate; the following is the exact time:—

	d.	h.	m.	s.
Three mean solar years = .....	1095	18	27	27
Thirty-seven lunations = .....	1092	15	19	14
Excess of 3 solar years above 37 lunations ...	3	3	8	13

† The intercalation of 2 lunations in 57 years would be required, making a large cycle of two unequal periods, viz. one of 28 and the other of 29 years. This will be seen by the following:—

	d.	h.	m.	s.
The excess of 3 <sup>d</sup> 3 <sup>h</sup> 8 <sup>m</sup> 13 <sup>s</sup> every third year				
would amount in 57 years to.....	59	11	35	7
Two intercalated lunations (one 28 years and				
and one 29) = .....	59	1	28	4

Leaving an excess in 57 years of only .....

This is less than one day in an entire century.

[These notes I add March 17th, 1875.—S. J. W.]

three months (from October and November to July and August) in a single century. That such a change has not taken place I believe is certain. It is now twenty-seven or twenty-eight years since the Palolo season was carefully observed by the missionaries then resident in Samoa, and their observations recorded in Europe\*. That no change has taken place since then the dates given in this paper prove.

I think it probable that there will be an extra intercalation of one lunation during the present year. If I am correct in my theory of 13 lunations every third year, and that the last period of 13 lunations was 1871-1872, the present interval ought (according to the smaller cycle) to be one of 12 lunations. This would bring the time of the worm's appearance to October 2nd of the present year (1874). But, as I have already stated, that date would be earlier in the month than any appearance of which we have certain knowledge. Hence I am inclined to predict the next appearance of *Palolo* on the 31st of October (local time), after an interval of 13 lunations from the corresponding October season in 1873 †.

In Dr. Seemann's work it is said the Fijians "expect a heavy shower of rain" after the Palolo have been cooked, "to put out the fires of their ovens. Should there be no rain a bad yam season is predicted." The Samoans have no such superstition as that of the Fijians connected with the Palolo; but they have from time immemorial recognized the fact that this worm makes its appearance at the time when a change of seasons takes place. Hence the time when the prevailing trade-wind changes from S.E. to N.E. at the commencement of the summer, or rainy season, is called the *vāi-palolo*, which means the space or time of the Palolo. The opposite season, when the trade-wind changes from N.E. to S.E. at the commencement of the dry season, is in like manner called the *vāi-to'elau*, meaning the space or time of the change from the north wind. This is, in my opinion, very positively in favour of the absolute identity, as to the time of year, of the present with the past Palolo seasons for a very long period. The *vāi-palolo* is as much an integral part of the Samoan dialect as is our word *spring* (with which it corresponds) an integral part of the English language; and its origin is not modern.

From the foregoing it is evident that a most remarkable compensation for the difference between *lunar* and *solar* time is made by some natural process in the development of this little annelid. I am not at present prepared to give an opinion as to how this can be effected.

N.B. Since writing the preceding, I have explained to an intelligent Samoan the occurrence of 13 lunations between the appearance of the Palolo every third year. After thinking a minute or two, he said, "That is the reason why so many mistakes have been made by Samoans in predicting the moon during which the Palolo will appear.

\* *Ibid* Enc. Brit. xi. p. 297, and P. Z. S. March 9th, 1847.

† This has since proved to be correct. See P.S. of March 17th, 1875.

We usually know the *day*, but often are in error as to the moon, and expect it one too early." In their old mode of reckoning the Samoans knew when the season was approaching by the flowering of certain plants. They found the *day* by the position of the moon. The *tenth* morning on which the moon is seen above the western horizon at dawn of day is the morning on which the Palolo appear. The Samoans always call the Palolo a fish (*i'a=ika* in other Polynesian dialects, and *ikau* in Malayan). This is the origin of a mistake made by one of the former missionaries, mentioned in the 'Encyclopædia Britannica.'

Upolu, Samoa, March 20th, 1874.

P.S. March 17th, 1875.

The preceding paper was forwarded to the Zoological Society of London by the mail *via* San Francisco in March, 1874; but having heard from Mr. Selater that it had not reached him on October 30th last, I now forward another copy, to which I have added a few notes under the present date.

In a note dated Nov. 17th, 1874, I have already informed Mr. Selater that the Palolo appeared in these islands on October 31st and November 1st, G. M. T., = November 1st and 2nd local time, thus proving the correctness of my opinion that that season would be one of 13 lunations.

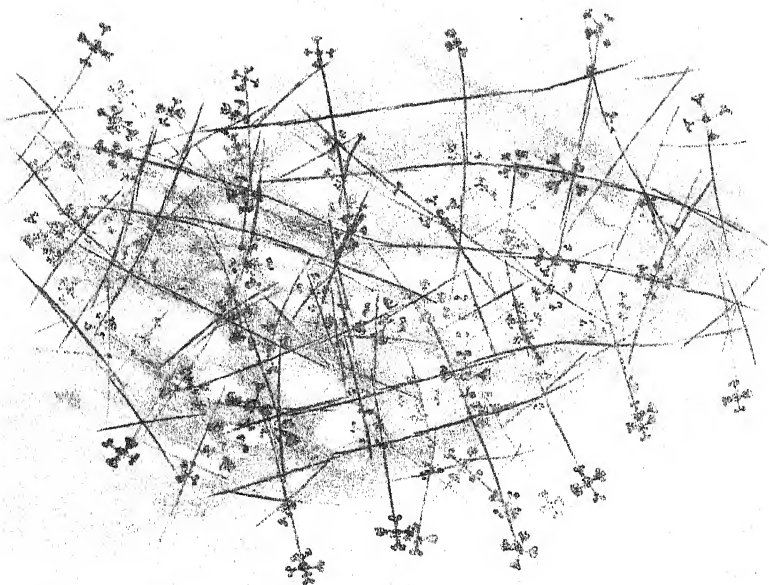
I sent a copy of the foregoing paper to Mr. E. L. Layard, F.Z.S., now Administrator of the Government in the colony of Fiji, in order that he might check my observations in those islands. I am sure he will excuse me for giving the following interesting quotation from his letter, dated Levuka, Dec. 9th, 1874, communicating his own observations :—

"I studied your paper with much interest, and anxiously awaited the time of the worm's appearance. The date assigned by you was very rough and stormy. The natives here laughed at the date—'Oh, it will be later!' Time came; no balolo! I was out, one among thirty boats. 'Oh, we have missed it by three days; it will be later.' Meanwhile news came from Loma-loma that they had them on *the very day you name*, the biggest take of balolo ever known. I now have my laugh at the people."

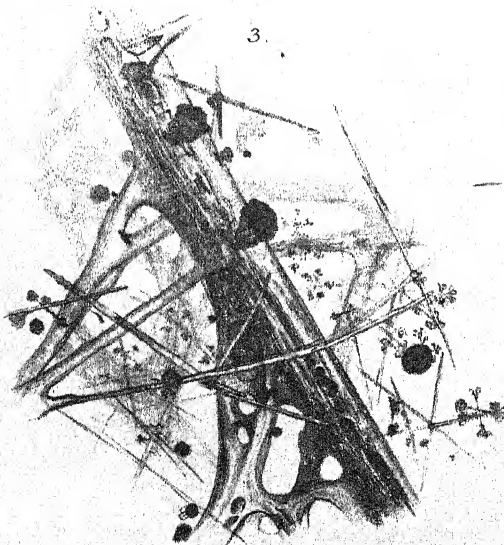
Mr. Layard obtained half a dozen specimens, and he says, "All took place as you observed. With my high-power glasses I found the eggs to be spotted; and I fancy the spots were the orifices by which the seminal vesicles of the male enter. These are very active in the water, gyrating in a singular manner. One male 1 inch long was enough to dim the transparency of 8 oz. of water. I saw no worm longer than 1½ inch, but received one 18 inches long from Loma-loma."



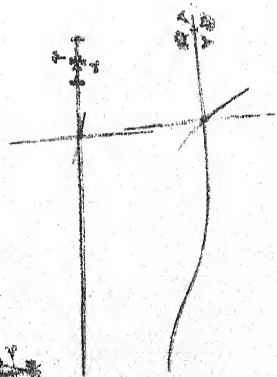
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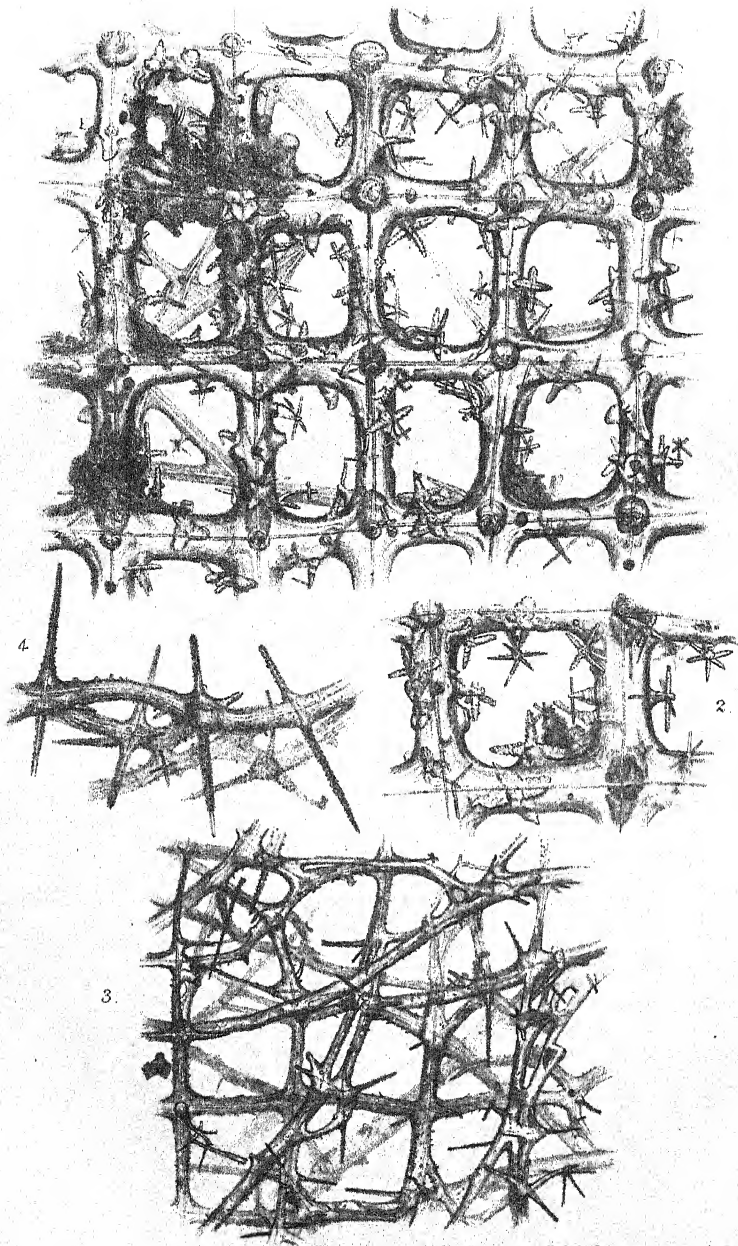


2.



*Acyoncellum speciosum.*





1, 2. *Farrea* *valida*.  
3, 4. " *spinosissima*.



5. A Monograph of the Siliceo-fibrous Sponges. By J. S. BOWERBANK, LL.D., F.R.S., F.Z.S., &c.—Part IV.

[Received June 8, 1875.]

(Plates LVI. & LVII.)

Further observations on the anatomy and physiology of

ALCYONCELLUM SPECIOSUM, Quoy et Gaimard. (Plate LVI.)

*Euplectella aspergillum*, Owen, Trans. Zool. Soc. iii. p. 203.

*Euplectella cucumer*, Owen, Trans. Linn. Soc. xxii. p. 17, pl. 21.

In my former observations on the anatomy and physiology of this singular and very beautiful Sponge, published in the Society's 'Proceedings' for 1867, p. 351, and for 1869, p. 346, I have stated that I had tried in vain to obtain a knowledge of the dermal structures of this sponge. In my paper of May 13, 1869, I detailed my examination of a very small fragment of what appeared to me to be the dermis; and subsequent examinations of other minute pieces of a similar description have confirmed the opinion I had then formed. Since 1869 I have made every possible effort to solve the problem of its dermal structure, but without any satisfactory result. What my best efforts could not attain, the good fortune of my friend Dr. John Miller, F.G.S. &c., has achieved by the acquisition of a specimen in which the skeleton of the dermal organization is in a perfect state of preservation; and I am much indebted to him for having kindly presented me with part of this beautiful and valuable specimen for examination and description. No portion of the sarcodous structures remain on any part of the specimen. These tissues appear to have been removed from the dermis by gradual undisturbed decomposition, leaving its siliceous skeleton *in situ* in a remarkably perfect state of preservation; and not only so with regard to the dermal skeleton, but the rigid skeleton of the sponge appears to be precisely in the same state as when living, every portion of it appearing to occupy its appropriate position, so as to enable us to render a much more correct account of its general structure. Hitherto the only specimens available for examination have been in such a well-washed condition as to render it extremely difficult to determine the true positions of the unattached spicula found among those of the rigid skeleton; and in many cases the rectangulated sex-radiate spicula of the dermis and the floricommo-sexradiate ones have evidently been washed into the interstices of the rigid skeleton.

On examining a portion of the sponge presented to me by Dr. Miller, mounted in Canada balsam, with a power of 100 linear, we find that at the inner surface of the specimen the large primary fibres of the skeleton are strikingly distinct; and in the irregularly shaped interstices of their reticulation there were numerous stout rectangulated sexradiate spicula, and a large number of the same form of various degrees of tenuity; their positions were mostly un-

conformable, both as regards each other and the large primary fibres of the skeleton; and I could not detect a single floricomose-sexradiate one among them. The simple rectangulated sexradiate spicula, when immersed amid the skeleton-fibres, usually had the whole of the six radii developed; but those at the inner margin of the great incurrent areas were frequently deficient of the distal axial ray, so that the four lateral rays were presented in the same plane as that of the inner margin of the great incurrent areas.

On examining the outer surface of the specimen we find a marvellously beautiful compound reticulated dermal skeleton elevated slightly above the general surface of the sponge-structures beneath. This exquisitely beautiful tissue is composed of a single layer of slender, simple, rectangulated sexradiate spicula, conformably arranged in the same plane, the long proximal ends of the central shafts being all pointed downwards towards the skeleton beneath, while the lateral radii of each spiculum glide over those of their next neighbours until the distal ends of their respective rays closely approach to the central shafts of each other, thus systematically interlocking with each other, and forming a beautiful quadrangular network in the dermal stratum. The distal portion of the central shaft of each simple rectangulated sexradiate spiculum has a single floricomose-sexradiate spiculum cemented to its apex, forming a uniform stratum at regular distances of these beautiful objects immediately beneath the outer surface of the dermal membrane.

The interstices of the quadrangular network are filled by a thin translucent membrane on which there are occasionally found, closely adhering to the membrane, groups of five or six minute quadrifurcate sexradiate stellate spicula, very similar in general structure to those of *Iphiteon Ingalli*, figured in the Society's 'Proceedings' for 1869, plate xxiii. fig. 2, p. 331—but with this difference, that the radii of those of *I. Ingalli* are spinulate, while those of *A. speciosum* are attenuated to exceedingly sharp distal terminations. These spicula are very slender and delicate in their proportions, and require a power of at least 400 linear to render them distinctly to the eye. A fully developed one measured as follows:—extreme diameter  $\frac{1}{428}$  inch; diameter of the sexradiate basal portion  $\frac{1}{600}$  inch; length of the furcating radii  $\frac{1}{600}$  inch; and the diameter of the thickest portion of furcating radii  $\frac{1}{800}$  inch.

Thus these beautifully constructed and elaborately arranged organs form most effective defences against minute annelids or other insidious enemies who may attempt to prey upon the soft gelatinous tissues of the sponge. A single mouthful of the minute sharp-pointed spicula of which their beautiful floral terminations are constructed would effectually deter these predacious little enemies from any further attacks upon the soft tissues of the sponge. A more complete or more effective mode of disposition of these wonderful defensive organs cannot possibly be conceived. These structures are amazingly beautiful to our eyes; but their admirable adaptation to their especial purposes infinitely surpasses their beauty in our estimation. To return to the peculiar mode of construction of the rectangulated net-

work of the dermis, we at once perceive that the spicula when thus united form a strong and elastic rectangulated network. This mode of combination of the simple sexradiate spicula is perfectly adapted to the power of dilatation and contraction that it appears should necessarily exist in all siliceous sponges, whatever their form may be, which have a rigid skeleton. We find these powers existing in all the species of *Dactylocalyx*, as represented in plates v. & vi., P. Z. S. 1869. But in these cases the expansion of the dermis is effected by various forms of ternate spicula, connected by the apices of their terminal radii, while their shafts are directed towards the body of the sponge, so as to allow, not only of a great amount of lateral expansion and contraction of the dermal membrane, but also of the separation of the dermis from the body of the sponge beneath it to a very considerable extent. In all the species of *Geodia* and *Pachymatisma* we find the same principle existing under various modifications. The expansile powers of the dermal tissues are also provided for, in the reticulated structures of *Isodictya* and *Halichondria*, by the conjunction and elastic adhesion of the terminations of the spicula forming the dermal rete, whether that organ be monospiculous, as in many species of *Isodictya*, or multispiculous, as in numerous species of *Halichondria* and several other genera; and where no such structures exist the dermal membrane alone is abundantly elastic, as exhibited in the protrusion of the large excurrent orifices in *Spongilla*, as figured in plate i. in the "Report on the Vital Powers of the Spongiadæ," in the Reports of the British Association for 1857. All these beautiful appliances appear to be combined in the structure of the dermis of *Aleyoncellum*; and in addition we have the floricommo-sexradiate forms terminating the distal apices of the dermal expansible arrangement of spicula, as defences of the external surface of the dermal membrane against the minute enemies, while the *chevaux-de-frise* forms beneath are an ample and effective defence against the more powerful depredators.

The spicula of the expansile dermal tissues vary in structure to a considerable extent in the different species of sponges in which they occur. In *Geodia Dysoni* they assume the form of simple patento-ternate spicula, their distal terminations being all in the same plane, their radii meeting and overlapping each other more or less, as represented in figs. 4 & 5, plate iii., P. Z. S. 1873; or they occur as bifurcated patento-ternate ones, as represented in figures 3 & 4, plate ii., P. Z. S. 1873, in the dermis of *Geodia perarmatus*. In the similar organs of *Dactylocalyx Pratti* their terminal radii are flattened and contorted to a considerable extent, as shown by figs. 9, 10, 11, plate v., P. Z. S. 1869; and in the same plate the radii of these spicula are expanded into beautiful foliations in the dermis of *Dactylocalyx M'Andrewii*, as represented in figures 2, 3, & 4. But however different their forms may be, their office in the expansile dermis of each sponge is precisely the same, and their long basal shafts are pendent, as represented in the section at right angles to the surface of *Dactylocalyx Prattii* in plate v. fig. 6a, P. Z. S. 1869. In all these cases the same design, with variations adapted

to the particular species, is apparent—that of allowing a considerable amount of expansion and contraction in the dermal system of the animal, so that, if the skeletons are rigid, the necessary expansions of the dermal organs of the animal may achieve inhalation and exhalation, as necessary to the sponge as to the higher classes of animals, of marine or land-living creatures; and this is precisely what takes place in the dermal system of *Alcyoncellum speciosum*, but in a more complicated and beautiful manner than in any other siliceo-fibrous sponge with which I am acquainted.

There are several other varieties of form of the remarkably constricted compound floricomous spicula which are figured in the 'Philosophical Transactions of the Royal Society' for 1857, plate xxvii., and also in plate viii. vol. i. 'Monograph of British Spongiadæ,' but none of these forms are elevated on the distal portion of the shaft of a simple rectangulated sexradiate spiculum, as in *Alcyoncellum speciosum*.

In the portion of the specimen mounted in Canada balsam in the cabinet of Dr. Miller I found a considerable number of gemmules dispersed amidst the tissues; some were on the skeleton-fibres, while others were attached to the interstitial membranes. They were membranous and aspiculous, closely resembling the same description of organs in *Dactylocalyx pumicea*, as represented in the 'Philosophical Transactions of the Royal Society' for 1862, plate xxxiv. figs. 17 & 18, and also in 'Monograph of British Spongiadæ,' vol. i. plate xxv. figs. 340 & 341. They varied in size to a much greater extent than those of *Dactylocalyx*. The largest one measured  $\frac{1}{385}$  inch in diameter; another was  $\frac{1}{300}$  inch in diameter; and the specimens ranging between these two sizes were comparatively numerous. Others, equally well developed, measured  $\frac{1}{2000}$  inch; and the smallest well-defined one was but  $\frac{1}{2666}$  inch in diameter.

Thus we have, by the aid of Dr. Miller's beautiful specimen, obtained a much more correct knowledge of the anatomy and physiology of this beautiful sponge than we previously possessed; and, in addition to these interesting facts, a letter published in the 'Times' April 30, 1875, from Her Majesty's ship 'Challenger,' contains some interesting information regarding its habits in its natural state. "The regaderas," as the Spaniards call them, "are found at a depth of about 100 fathoms. The Indian lets down his bamboo arrangement with a strong fine line of Manilla hemp, and pulls it slowly over the ground. Every now and then he feels a slight tug; and at the end of an hour or so he pulls it in, with usually from five to ten 'regaderas' entangled on the hooks. *Euplectella* has a very different appearance, under these circumstances, from the cones of glossy network in the British Museum. Its silver beard is clogged with the dark grey mud in which it lives, buried to about one third of its height; and the network of the remainder of the tube is covered with a pall of yellowish fleshy matter, which gives it a heavy look, and greatly diminishes its beauty. The layer of flesh is not so thick as we expected, and only slightly masks the form of even the detailed sculpture of the sponge."

In my description of *A. speciosum*, in P. Z. S., May 13, 1869, p. 346, I described a small fragment of what was probably the dermal membrane of the sponge, beneath which the elaborate and beautiful defensive arrangement of spicula described in this paper would be situated. The account of this little fragment foreshadows the description of the investing animal tissues of the sponge described by the correspondent from the 'Challenger,' quoted above.

*FARREA VALIDA*, Bowerbank. (Plate LVII. figs. 1 & 2.)

Sponge-mass unknown. Dermis furnished with a stout, quadrilateral, smooth or, rarely, slightly tuberculated siliceo-fibrous network, armed at the angles externally and internally with short, stout, imbricated, conical spicular defences; areas square or slightly oblong, very regular, sides of the areas abundantly armed with rectangulated sexradiate defensive organs; radii spinous; spines acutely conical; fibres of the dermal rete cylindrical, very stout, equable in size, canaliculated; canals regular, strongly produced, confluent at the angles. Skeleton-rete quadrangular, areas larger than those of the dermal network. Fibre smooth, not more than one third the diameter of those of the dermis; canals large and well developed. Dermal membrane obsolete.

Colour, in the dried state, dark amber-brown.

*Hab.* Unknown.

Examined in the dried state.

All that I know of this sponge is a piece of the dermal network a quarter of an inch in length by one eighth of an inch in breadth. It is mounted in Canada balsam. Beneath the dermal rete there is a small portion of the true skeleton-rete *in situ*.

The specific characters derivable from the dermal structures are remarkably striking. The fibres of the dermal structure are comparatively very large; their average diameter measured  $\frac{1}{250}$  inch, while those of the true skeleton averaged  $\frac{1}{500}$  inch only, and the central canals in both measured  $\frac{1}{3000}$  inch. The fibres of the dermal structure are spineless; but there are occasionally a few low rounded tubercles dispersed on their surfaces. The mode of the reticulation is exceedingly regular; and the areas are all square or, to a slight extent, oblong, slightly curved at the angles. The conical spicular defensive organs at the angles are short, but very stout, and the imbricated scales are strongly produced. The most strikingly distinctive characters are the numerous rectangulated sexradiate defensive organs, based on the dermal fibres, and projected into the areas frequently to the extent of half their breadth. Their number is very considerable; and four or five are not uncommon in a single area. They vary in size and form to a very considerable extent, some being exceedingly stout, and abundantly and strongly spinous, while others are slender and delicately spinous. All these organs appear to be furnished with a central canal; but it is frequently rendered indistinct by the profusion of spines on the surface of the organ. The small portion of the true skeleton does not present

any remarkable characters. The fibres are usually quite smooth; occasionally, however, there are small and very immature rectangulated sexradiate defensive organs; but I did not see a single well-produced one. There were a few small portions of the dermal membrane in a good state of preservation, upon which there was a rather thick layer of sarcode; but I could not detect in it any thing in the shape of spicula. The specimen from which the above description has been made was in the possession of my late friend Mr. Henry Deane, who kindly obliged me with the use of it for description; and his son, Mr. James Deane, has kindly given me the specimen.

*FARREA SPINOSISSIMA*, Bowerbank. (Plate LVII. figs. 3 & 4.)

Sponge cup-shaped? Dermis, oscula, and pores unknown. Skeleton rectangulated, composed of three or four layers; fibres of the external ones of rather greater diameter than those intervening, more regularly disposed; areas variable in size and form, abundantly armed with very long, slender, defensive prickles, projected in various directions, more or less incipiently spinous, spines acutely conical—and also sparingly with rather small rectangulated sexradiate internal defensive organs. Skeleton-fibre rather slender, usually smooth, occasionally furnished with a few acutely conical spines; central canals variable in size, usually slender, occasionally obsolete. Sarcode, in the dried state, dark amber-brown.

Colour, in the dried state, dark amber-brown.

*Hab.* Unknown.

Examined in the skeleton-state.

I am indebted to my late friend Mr. Henry Deane for the only specimen of this species with which I am acquainted. It is a plate of skeleton-tissue 8 lines in diameter. It is curved to such an extent as would seem to indicate that it had formed part of a cup-shaped sponge two or three inches in diameter. In some parts of the structure there are as many as four layers of the skeleton-tissue; but the number most frequently seen is three. The prominent and most distinctive character is the long slender prickles projecting from the skeleton-fibres at right angles to their long axis; sometimes one only is thus produced, but more frequently two in opposite directions, or three are thus projected at about equal distances from a line encircling a fibre. They are always very slender; but they differ in length to a considerable extent: in some cases their length is about equal to the diameter of the fibre on which they are based; but they are frequently three or four times that length. I could not detect the slightest indication of dermal or interstitial membranes with a power of 80 linear; nearly the whole of the skeleton-fibres were more or less covered by a thin coat of dark amber-coloured sarcode; and the long defensive prickles were much more thickly coated with the sarcode than the skeleton-fibres; and this coating of the prickles was mostly thin at their proximal ends, and gradually increased in its thickness to their distal extremities, frequently becoming slightly clavate.

A few such prickles as described above occur in *F. spinifera*; but the greater size of the skeleton-fibres and their more compact and regular mode of arrangement, their large and very distinct canals, at once distinguish that species from *F. spinosissima*.

#### DESCRIPTION OF THE PLATES.

##### PLATE LVI.

- Fig. 1 represents a portion of the skeleton of the dermal system of *Alcyoncellum speciosum*, as seen *in situ* on a piece of Dr. Miller's specimen of the sponge mounted by him in Canada balsam, exhibiting the mode of arrangement of the slender rectangulated sexradiate spicula, with the floricommo-sexradiate defensive ones attached to the distal terminations of each of the reticulating spicula,  $\times 36$  linear. In plate xxiv. P. Z. S. for 1869, fig. 11 represents one of the floricommo-sexradiate spicula  $\times 666$  linear; fig. 10 one of the dermal simple rectangulated sexradiate spicula to which the floricommo-sexradiate ones are attached,  $\times 108$  linear; and fig. 9 represents one of the slender attenuated rectangular sexradiate spicula of the skeleton interstitial structures,  $\times 175$  linear.
- Fig. 2. Two of the slender rectangulated sexradiate dermal spicula as seen *in situ*, showing the mode in which the lateral radii pass freely over each other, so as to allow of the expansile action of the dermal system,  $\times 80$  linear.
- Fig. 3. A small piece of the skeleton-fibres of the sponge immediately beneath the dermal system, with numerous gemmules in various stages of development, attached either to the fibres of the skeleton or to the translucent interstitial membranes,  $\times 80$  linear.

##### PLATE LVII.

- Fig. 1 represents a small portion of the stout and beautifully regular dermal reticulation of *Farrea valida*, with its numerous rectangulated sexradiate defensive organs based on the fibres, with a portion of the slender reticulated skeleton beneath it,  $\times 61$  linear.
- Fig. 2. A small portion of the dermal reticulation, exhibiting more distinctly the structure and mode of disposition of the rectangulated sexradiate defensive organs,  $\times 80$  linear.
- Fig. 3 represents a small piece of the skeleton-structure of *Farrea spinosissima*, with its numerous attenuated defensive spinous prickles,  $\times 36$  linear.
- Fig. 4. A small portion of the fibre of the sponge, more highly magnified, exhibiting the mode of disposition of the spinous defensive prickles coated with sarcodæ,  $\times 80$  linear.

6. On the large Sheep of the Thian Shan, and the other Asiatic Argali. By Sir VICTOR BROOKE, Bart., F.Z.S., and BASIL BROOKE, F.Z.S.

[Received June 14, 1875.]

Captain Biddulph having shown (*antea*, p. 157) appreciable points of distinction between the large Wild Sheep obtained by the officers of the Yarkand Mission on the Thian Shan, described by Dr. Stoliczka as *Ovis poli* (P. Z. S. 1874, p. 425), and the true *Ovis poli* of Blyth from the Great Pamir, we have been induced to study

all that is known of the large Argali Sheep of Central Asia, in the hopes of determining the Thian-Shan species, and of ascertaining what may be regarded as established facts respecting the differentiation and distribution of the allied forms.

This study has convinced us that our knowledge of the physical geography and fauna of Central Asia is as yet far too inexact to admit of any thing more than a mere statement of bare facts. We have therefore concentrated our efforts upon the task of placing all the facts that we have been able to gather in as easily accessible a form as possible, without attempting to estimate the exact value of characters of the origin and extent of which we at present know but little. Many of the specimens collected by the Yarkand Mission are now in London, and we have had the fullest opportunity of examining them. To Mr. Edwin Ward our best thanks are especially due for the many facilities which he has offered to us, at, we fear, considerable inconvenience, for studying the specimens committed to his charge.

By far the most important recent contribution to our knowledge of the subject before us is due to the laborious and careful researches of Mr. N. A. Severtzoff, the results of which are published in the 'Transactions of the Imperial Society of Naturalists of Moscow,' vol. viii., and also in a separate work entitled 'Vertikalnoe e Goroyontalnoe Raspredalenie Turkestankie Jevotnie' (Moscow, 1873). Unfortunately both Mr. Severtzoff's works are written in Russian, a language which is utterly unintelligible to the larger number of European and American naturalists. We feel, therefore, that no excuse is necessary for laying before the Society a more or less full abstract of all that touches the subject of this paper\*.

Almost all we know respecting the Turkestan species being contained in Severtzoff's work, we shall, in treating of these species, adhere as closely as possible to Mr. Severtzoff's own words. At the end of the account of each species we will add any observations which may suggest themselves to us as worthy of notice. In the case of the species not found in Turkestan, we shall give original descriptions of specimens personally examined in either British or Continental museums; and finally we shall append a table of all the specimens which we have examined, with their measurements, followed by a list containing remarks on the individual peculiarities of each specimen, and the name of the Museum, public or private, in which it may be found.

Before describing the different species of Sheep met with by him in Turkestan, Mr. Severtzoff defines clearly the terms used by him in his descriptions of the horns of Sheep; and, although we are unable to agree with Mr. Severtzoff in the value which he attaches to the characters afforded by the horns, we fully appreciate the practical utility of Mr. Severtzoff's definitions. We propose, therefore, following his example, to define as exactly as possible the features observable in an adult typical Sheep's horn, giving to each a

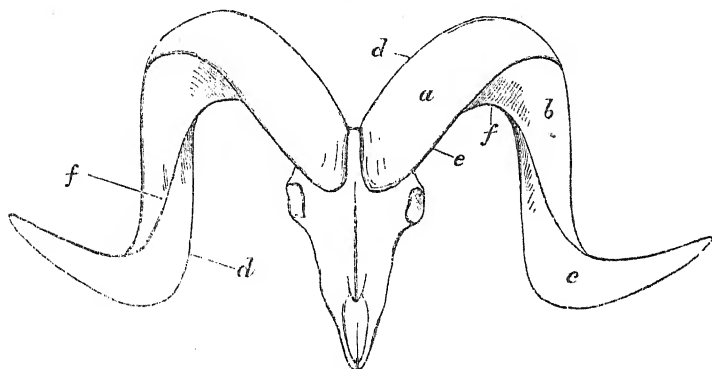
\* Mr. Severtzoff's descriptions have been translated for us by Mr. F. Cramer.



distinct name that will not only render intelligible Mr. Severtzoff's descriptions, but may also be used in future in the comparisons and descriptions of these parts.

The horn of an adult typical Sheep is divided by three more or less distinct edges into three surfaces. Of these latter (speaking of the basal portion of the horn), one is anterior (fig. 1, *a*), one exterior (fig. 1, *b*), and one interior (fig. 1, *c*). The first-mentioned of these surfaces we propose naming the *frontal surface*, the second the *orbital surface*, and the third the *nuchal surface*. These terms

Fig. 1.



*a.* Frontal surface.  
*b.* Orbital surface.  
*c.* Nuchal surface.

*d.* Fronto-nuchal edge.  
*e.* Fronto-orbital edge.  
*f.* Nuchal edge.

appear to us preferable to the terms anterior, exterior, and interior, as, owing to the spiral twist of the horns, the relative position of the surfaces is reversed in their basal and terminal extremities. Of the two edges which border the frontal surface, one (fig. 1, *d*) is interior, forming at its origin the nearest approach of the horns; this we shall refer to as the *fronto-nuchal* edge, the other, the exterior (fig. 1, *e*), as the *fronto-orbital* edge. The remaining edge (fig. 1, *f*) we shall term the *nuchal* edge.

Further, the entire spiral of the horn may be divided into three curves:—

1. The basal curve ascends.
2. The median curve descends.
3. The terminal curve varies in direction according to the length of the horn.

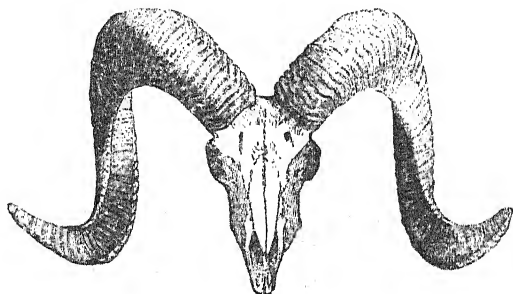
The angles formed by the axes of these curves, both with each other and with the vertical axis of the skull, have been used by Mr. Severtzoff as characters for distinguishing the different species. These we shall refer to as the *basal*, *median*, and *terminal* axis.

We now proceed to give abstracts of Mr. Severtzoff's descriptions of the species observed by him in Turkestan.

"*Ovis karelini*. (Figs. 2 and 3.)

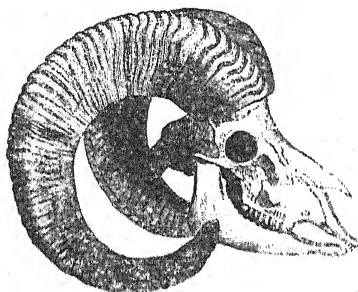
"I have named this species after the worthy explorer of Central Asia, who was also the first to obtain specimens of the species in the Ala Tau, near Semiretchinsk, about 1840. The specimens have up to the present been considered identical with *Ovis argali* (Pallas).

Fig. 2.



*Ovis karelini* (specimen b in list).

Fig. 3.



*Ovis karelini* (specimen b in list).

I have, however, upon a comparison of my two perfect specimens and the three specimens obtained by Karelin, separated this form from the true East-Siberian *Ovis argali* of Pallas. Of this latter species there are three skulls and a perfect specimen in the Moscow University Museum."

*Description*.—"The horns are moderately thick, with rather

rounded edges; frontal surface very prominent; orbital surface rather flat, narrowing only in the last third of its length. The horns are three times as long as the skull. The basal and terminal axes of the horn rise parallel with each other; . . . the median axis is parallel with the axis of the skull. . . . The neck is covered by a white mane, shaded with greyish brown. The light brown of the back and sides is separated from the yellowish white of the belly by a wide dark line. The light brown of the upper parts gets gradually lighter towards the tail, where it becomes greyish white, but does not form a sharply marked anal disk. On the back there is a sharply marked dark line running from the shoulders to the loins. I did not find any soft hair under the long winter hair in October. . . . Height at the shoulder 3 feet 6 inches, length of the horns from 41" to 45".

*Range*.—" *Ovis karelini* inhabits all the Semiretchinsk Altai, and also the Sapliskey Altai, but is not so common there as in the mountains between Tamgali (?) and Kaskelen; but it is partly driven from this latter locality by the Cossack sportsmen, and has gone to a higher elevation, namely the Kebin Steppe, above the range of trees. East of Tamgali (?) (Turgeli?), on the bare mountains and plains near the rivers Chilik and Kelen, *Ovis karelini* is very abundant, but not on the mountains covered with trees; it extends from this locality as far as Santash. Further it inhabits all the neighbourhood of Issik Kul; is rather rare on the northern parts of the Thian Shan, which are thickly wooded. I also met with numerous flocks in the steppes of the Narin, where they find abundance of food and shelter at an elevation of about 12,000 or 13,000 feet above the level of the sea. This species is also met with on the mountains separating the Narin from its tributary the Atpash, as far as the plains between the rivers Kurtka and Chatir Kul; but from the eastern sources of the Atpash as far as the Chatir-Kul it is found only in company with *Ovis polii*."

*Habits*.—" *Ovis karelini*, like other Sheep, does not live exclusively amongst the rocks, as is the case with the different species of *Capra*. It is not satisfied, like the latter, with small tufts of grass growing in the clefts of the rocks, but requires more extensive feeding-grounds; it is therefore more easily driven from certain districts than is the case with *Capra*. In the neighbourhood of Kopal, for instance, the Goats are abundant in the central parts of the steppes of Kara, whilst the Sheep have been partially driven from these places, only visiting them in autumn.

"On the southern ranges of the Semiretchinsk Altai, in the vicinity of the river Ili, wherever good meadows and rocky places are found, *Ovis karelini* occurs at elevations of from 2000 to 3000 feet; at the sources of the rivers Lepsa, Sarkan, Kora, Karatala, and Koksa it goes as high as 10,000 feet, and even to 12,000 feet in the neighbourhood of the Upper Narin. In winter it is found at much lower elevations."

We have no hesitation in referring the specimens obtained by the Yarkand Mission to the south of Chatir Kul, on the Thian Shan, to

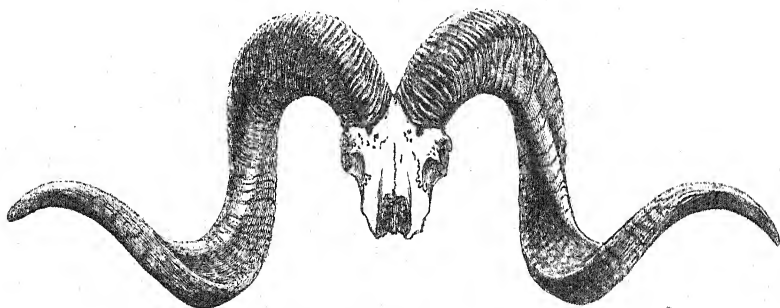
this species. Colonel Gordon's specimen (specimen *a* of list) shows a very much greater extent of white on the lower sides and haunches than appears to have been the case in either of Mr. Severtzoff's specimens; the white anal disk is strongly defined from the rosy fawn colour of the upper parts of the back by a distinctly darker shade.

"*OVIS POLI*. (Figs. 4 and 5.)

"This species was founded upon specimens obtained by Wood at the sources of the Amu Daria, on the high plains near the Lake Siri Kul, at an elevation of about 16,000 feet, consequently about the same locality as that mentioned by Marco Polo."

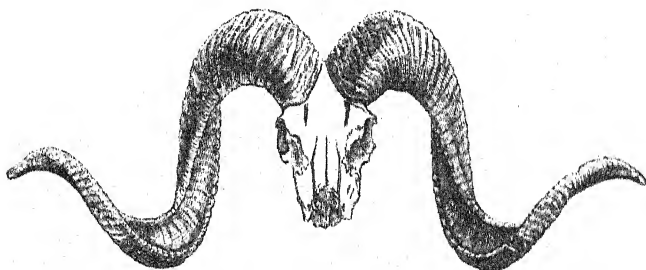
*Description*.—"The horns are very large, pressed in from the sides, the edges, with the exception of the fronto-nuchal edge, being

Fig. 4.



*Ovis poli*, larger example (specimen *f* in list).

Fig. 4 *a*.



*Ovis poli*, smaller example (specimen *g* in list).

rounded. The orbital surface is pressed in, and commences to get narrower only during the last third of its length. The horn is more than four times the length of the skull. The basal and terminal axes of the horns are not parallel, the latter being directed more horizontally. . . . All round the neck there is a pure white mane;

and there is a dark line along the spiral column from the shoulders to the loins. The light greyish brown of the sides shades off into white towards the belly. A pure white anal disk surrounds the tail; above this disk is bordered by a rather dark line; but below it extends largely over the hinder parts of the thighs, shading gradually into the brown colour of the legs. I did not discover any soft short hair under the long winter hair during the month of October. Height 46", length of horns 57". . . .

Fig. 5.

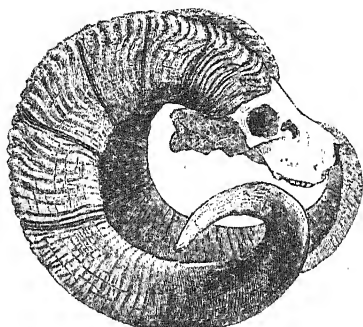
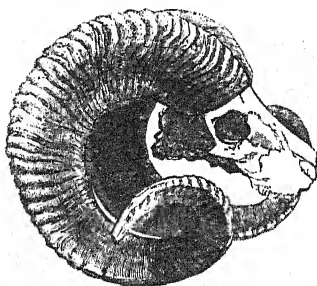
*Ovis poli*, larger example (specimen *f* in list).

Fig. 5 a.

*Ovis poli*, smaller example (specimen *g* in list).

"Such is the coloration of *Ovis poli* in winter. The specimens seen by Mr. Semenoff on the Khan Tengri in summer appeared to be dark brown."

*Range*.—" *Ovis poli* was met with by Mr. Semenoff on the high plains near the snow-covered summits of the gigantic mountains of Khan Tengri, at the sources of the rivers Karkara, Tekes, and Sari-

jaws. These places form the most northern limits of its range, which to the south-west extends as far as the Narin, the upper Sir Daria, and the tributaries of the Kashgar Daria. I found skulls of *Ovis poli* within a distance of 10 or 12 versts north of these rivers, at Ulan, on the mountains of Atpash; here it lives, mixed in very limited numbers with *Ovis karelini*, this locality constituting the narrow district where the two species are found together. On the high plain of Aksai only *Ovis poli* is to be met with, where it is very abundant. Here it usually keeps in the mountains of Bos-adir, on the north shores of the Aksai, and feeds on the hilly meadows close to the river. It has, as yet, not been obtained further north.

"On Khan Tengri, on the hills of Karkara and Tekes, *Ovis poli* is not met with below an elevation of 10,000 feet; but it is here rather rare, as it prefers the grass-covered plains near the level of the eternal snow. These plains are about 11,000 feet above the sea. On the Aksai the limits of its range are formed by the river of the same name between the mountains of Kokkia and Bos-adir. It is here, as on the Atpash Mountains, found as low as 9000 feet, ranging from this altitude to that of the eternal snow."

*Habits.*—"This animal is not a regular inhabitant of the mountains and rocks, but of high-situated hilly plains, where *Festuca*, *Artemisia*, and even *Salsola* form its principal food. It only takes to the mountains for the purposes of concealment, avoiding even then the more rocky localities, as, for instance, the Kok-kia, near the Aksai, where I only met with *Capra skyn*. Wherever *Ovis poli* has been met with, it has been found inhabiting the same localities during the summer and winter; the latter season, though cold, is remarkably free from snow, the winter clouds being intercepted by the lower mountains before reaching the elevations inhabited by the Sheep. I saw this species on Khan Tengri and Aksai in small scattered flocks of from five to ten individuals—unlike *Ovis karelini*, which species I have seen in flocks of hundreds in the neighbourhood of the Narin. The speed of *Ovis poli* is very great; but the difficulty in overtaking wounded specimens may be partly attributed to the distressing effect of the rarefied air upon the horses, which has apparently no effect whatever upon the Sheep. The weight of an old specimen killed and gralloched by me was too much for a strong mountain-camel, the animal requiring 4 hours to accomplish 4 versts, and being obliged to lie down several times during the journey. At low elevations a camel can carry 17 poods with ease, but in these lofty plains not more than 11 or 12 poods; the entire weight of a male *Ovis poli* will therefore be not less than 16 or 17 poods; the head and horns alone weigh over 2 poods."

As may be seen by a comparison of the measurements of the *Ovis poli* obtained by Mr. Severtzoff on the Aksai Plain with those of the specimens from the Pamir examined by us, the horns are of about equal length in the Thian-Shan and Pamir *Ovis poli*, but they are of considerably wider span in the specimens from the Pamir. It may, however, be possible that specimens exhibiting a much wider span are procurable in the Thian Shan than those

obtained by Severtzoff. The fact of *Ovis poli* and *Ovis karelini* inhabiting the same area on the Upper Narin seems to us to indicate the probability that the difference between these two forms is not so superficial as might be at first supposed.

"*OVIS HEINSI*.

"I have thus named this species, the first specimen having been sent me by General Heins from Tokmack."

*Description*.—"The horns are not massive; they are pressed in from the sides, and have three sharp edges; the inner spiral would fit on an inverted cone with the base turned toward the skull. . . . A section of the base of the horn shows the nuchal surface to be a little narrower than the orbital surface, each of these surfaces being  $1\frac{1}{2}$  times as wide as the frontal surface. The basal axis of the horn and the vertical axis of the skull form an angle of about  $40^\circ$ , the basal with the median axis an angle of about  $31^\circ$ ; the latter and the terminal axis form a right angle. . . . The height, judging from the skull, would be a little less than that of *Ovis karelini*. . . ."

*Range*.—"This species is only known from the skulls of middle-aged specimens with incompletely developed horns. . . . These specimens were, as above stated, found in the Tokmack district, without, however, any more exact particulars as to locality. The geographical distribution of the species is therefore unknown. Some greyish brown Sheep seen by me in the Alexandrovski district, near Merke, belong, I think, to this species. They were seen at an elevation of about 8000 feet, near the rivers Katchara and Chu. Mr. Semenoff was also told by the Kirgees about these Sheep; and they could hardly, I think, be *Ovis poli*."

"The horns of *Ovis heinsi* are not much smaller than those of *Ovis poli* of the same age. The skull of a specimen of *Ovis heinsi*, aged 5 years, measured  $11'' 4'''$ ; the length of the horns is  $33'' 2'''$ , and the span between the tips is  $31'' 4'''$ . The same measurements in *Ovis poli* of the same age are respectively  $12'' 6'''$ ,  $37''$ , and  $35''$ . . . . The Kirgees people might easily mistake this species for *Ovis poli*."

"*OVIS NIGRIMONTANA*.

"I have thus named this species on account of its having been first met with in the Karatau or Black Mountains."

*Description*.—"The horns are not massive; the fronto-nuchal edge is very sharp, the other two edges are also not much rounded; the frontal surface is narrow, but prominent; the other two surfaces pressed in, rendering the edges sharp, especially the fronto-nuchal edge. A section of the base of the horn shows the orbital and nuchal surfaces to be nearly equal in width, each of them being about  $1\frac{1}{2}$  times as wide as the frontal surface. The axis of the skull and the basal axis of the horn form an angle of about  $38^\circ$ , the median and basal axes an angle of  $23^\circ$ ; and the angle of the terminal axis of the horn and the vertical axis of the skull is  $63^\circ$ . The ridges of the horn are sharp, straight, and regularly parallel with each other. . . ."

"This species is, like *Ovis heinsi*, only known from skulls; amongst these is one of an adult male. Through a telescope I saw that the colour of the animal is light greyish brown, with a white belly and rump. It is considerably smaller than *Ovis karelini*;" indeed it is "one of the smallest and weakest of all the Central-Asiatic Sheep."

*Range*.—"This species inhabits the entire Karatau, with the exception of a few localities. It is abundant on the summits of the Buguni, on the rocks near Marnin-sas, and on the western portions of the Teranisk hills, where the numerous steep rocks and clefts near Boroldai afford them excellent security. They also occur on the summits of the Chayan Mountains; further to the west I met with the species on the rocks of the Turlausky-pereval; and, according to the statements of the people there, they are abundant also on the Min-Dielki, the highest point in the Karatau, where they ascend as high as 7000 feet. To the north-westward they are found all over the Karatau, and even at their feet, where the steppes commence, namely on the Kara-Murun hills, which are not more than 1000 feet above the level of the steppe, or 1500 feet above the sea-level."

*Habits*.—" *Ovis nigrimontana* keeps in very small flocks consisting of three or four individuals; they are found also sometimes single." Mr. Severtzoff attributes this to the rocky nature of the ground to which the animals have been driven by the wandering tribes of the Kirgees.

*Part of Mr. Severtzoff's Table of Measurements of the Wild Sheep of Turkestan.*

	<i>Ovis poli</i> , adult ♂.	<i>O. karelini</i> , adult ♂.	<i>O. heinsi</i> , 5-years ♂.	<i>O. nigrimontana</i> , adult ♂.
	in. lin.	in. lin.	in. lin.	in. lin.
Length from nose to tail ...	79 0	71 0	...	57 0
Height at the shoulder .....	46 0	42 6	...	34 0
Length of horn .....	57 0	44 0	33 2	38 0
Distance between tips of horns .....	42 0	32 0	31 4	20 6
Width of temple side of horn (orbital surface)...	6 0	5 4	4 2	4 0
Width of nape side (nuchal surface) .....	...	...	...	...
Length of skull .....	14 0	13 3	11 4	10 8

The height and length of *Ovis nigrimontana* has been calculated from the size of the skull.

We will now give descriptions of the Asiatic Argali not found in Turkestan.

**OVIS AMMON.**

1766. *Capra ammon*, Linn. Syst. Nat. edit. xii. p. 97.



1766. *Ovis argali*, Pall. Spic. Zool. fasc. xi. p. 20, tab. 1, 2.

1862. *Ovis argali*, Radde, Reis. im Süd. v. O.-Sib. p. 238.

*Adult* ♂, summer?, in Mus. Brit., received from Brandt, Mus. St. Petersburg. Locality given, Siberia (specimen *n* of list).

Hair soft and close-set, about an inch in length; the same length on neck and body. General colour of the head, neck, body, belly, limbs externally as far as the carpi and tarsi rufous brown, tinged with grey. On the face the grey predominates greatly. There is also a strong shade of grey on the upper parts of the neck and shoulders. On the lower parts of the body the rufous becomes more intense. The upper part of the tail is fawn-colour. There is no sign of a white disk round the tail, the brown of the haunches becoming merely paler on the infra-anal parts. Limbs from the carpi and tarsi downwards dirty white, clearest on the inside. Horns massive, their points of moderate length, and turned boldly outwards. (For further particulars *vide* list, specimen *n*.)

*Adult* ♂, winter?, Mus. Lugd., received from Brandt, Mus. St. Petersburg. Locality given, Siberia (specimen *o* of list).

The general colour of this specimen is much the same as that last described, perhaps rather brighter. A pure white disk surrounds the tail, and runs down the haunches posteriorly. The hair of the neck is slightly lengthened, but of the same colour as that of the body. The white of the anterior parts of the face, lower limbs, and posterior part of the belly is much purer than is the case in the former specimen. The horns are very massive and deeply sulcated (*vide* list, spec. *o*).

*Adult* ♀, season?, Mus. Brit. from St. Petersburg. Darker than the male in the same collection. An indistinct pale disk surrounds the tail. Horns  $20\frac{1}{2}$ " long, 7" in circumference.

*Adult* ♂, autumn?, Mus. Amsterdam. Locality given, Northern Asia (specimen *p* of list).

Centre of back hoary; lower parts of body brownish grey. The rump is white, but the white does not surround the tail so as to form a disk. Hair on the neck not longer than that on the body.

*Range*.—The range of this species appears to be of great extent; but its boundaries are as yet most uncertain. Radde, in his 'Reisen im Süden von Ost-Sibirien,' published in 1862, p. 239, thus writes:—"Since the winter of 1831-32, the Argali has not been met with on the Daurian frontier, and it is also extinct in East Siberia." And again, at p. 241:—"The Argali avoids damp wooded mountains; it is wanting in the Kentei and Southern Apfel Mountains. This latter, as well as the adjoining Chingan and Bureja ranges, and indeed the greater part of the Stanovoi Mountains, appear to possess no representative of the genus *Ægocerus*. . . . To the Birar Tungsus, as well as to the Daurians, who possess information of Eastern Mongolia as far as Dalai-nor, was the Argali Sheep known only by name. In entire Russian Dauria, as well as in the Baikal Mountains, the hunters could tell me nothing of the occurrence of either the Argali or *Ægocerus sibiricus*. To the far south of Kentei is the Argali first met with, from which place the Cossacks of the frontier stations

Altansk, Bukukun, and Kirinsk sometimes obtain skins by barter. This is also the case in Eastern Sajau. The Cossacks of Tunkinsk exchange with the Darchates the skins of *Antelope gutturosa* and of the Argali, of which species I saw skins at Schimki. It is also known to the Sojotes and Burjates of the Upper Irkut."

According to Severtzoff the Argali does not occur in Turkestan; but he believes that it ranges "to the east of the desert of Gobi over the mountains of the Upper Salenga, Higan, where it has been met with, and probably further south over the Inshan, and about the sources of the two great Chinese rivers. This will either be proved or negatived by Mr. Prjevalsky, who is now exploring this part of the country." Mr. Severtzoff appears to be uncertain as to whether the Sheep bearing the name of Argali which inhabits the low hills of the Siberian Kirgees steppes of Karkalinsk, Orkatsk, and Aldan-adersk belong to this species or not.

*Ovis hodgsonii*. (Figs. 6 and 7).

1833. *Ovis nayaur* or *argali*, Hodgs. Asiat. Res. vol. xviii. part 2, p. 133 (part).

1840. *Ovis hodgsonii*, Blyth, P. Z. S. p. 65.

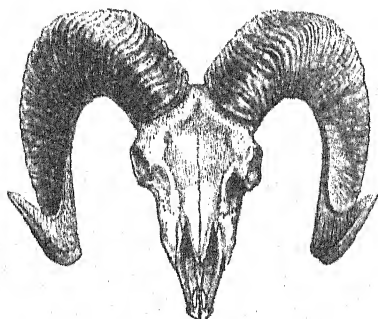
1841. *Ovis ammonoides*, Hodgs. Journ. Asiat. Soc. p. 230, pl. 1.

1860. *Ovis hodgsonii*, Scat. P. Z. S. 1860, p. 129.

*Adult* ♂, winter, Colebrooke collection. Obtained within 30 miles of Leh in the winter of 1873 (spec. *u* of list).

Hair of body about 2 inches in length, coarse and close-set. On the sides and lower surface of the neck the hair is lengthened into a long rich ruff-like mane of a snow-white colour. Along the median line of the upper neck there is a narrow band of rather shorter hair,

Fig. 6.

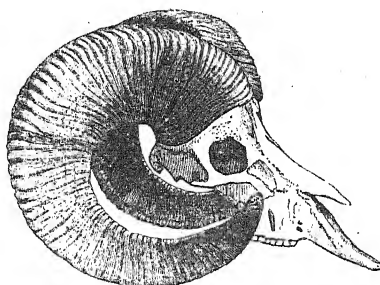


*Ovis hodgsonii* (specimen *a* in list).

which, however, is about twice as long as that on the body, and, being continued as far back as the withers, forms a short dorsal mane. General colour of the body dark brown, mixed with grey. Anterior parts of the face, belly, limbs below the carpi and tarsi

internally, and a small anal disk surrounding the tail and rump dirty white. Cheeks and forearms darker than the rest of the body. Ears and tail short, the latter with a narrow dark line along its upper surface. Horns massive and rather short, their terminal curve being but slightly developed (for further particulars *vide* list, spec. *u*).

Fig. 7.

*Ovis hodgsoni*, side view (specimen *a* in list).

♀. Much paler than the male, with little or no mane. No distinct anal disk.

*Range*.—Little Thibet (*Kinloch, &c.*); Cachar region, Nepaul (*Hodgson*).

#### OVIS BROOKEI.

*Ovis brookei*, Ward, P. Z. S. 1874, p. 143.

This species is based upon a skull and horns in our own collection. The locality from which the specimen was obtained is not so certain as could be desired; but we have strong reasons for believing that the animal was shot in the vicinity of Leh, in Ladak. In its much smaller size it differs from *Ovis hodgsoni*; and in its deeply sulcated horns, the angles of which are very much rounded, and the terminal curve but very slightly developed, it differs as decidedly from *Ovis karelini*. It is not improbable that the species will be found to inhabit the Kuenluen Mountains.

#### *Dimensions of the Specimen.*

Length of skull measured from the highest point between the horns .....	in. 11
Smallest breadth between orbits .....	4 $\frac{1}{2}$
Length of horns, round the curve .....	33 $\frac{1}{2}$
Circumference of horns .....	13 $\frac{3}{8}$

#### OVIS NIVICOLA.

1829. *Ovis nivicola*, Eschsch. Zool. Atlas, p. 1, Taf. 1.

1851. *Ovis montanus*, Midd. Reise, Zool. p. 116, Taf. xii. figs. 1, 2.

*Adult* ♂. (winter) Mus. Lugd. Kamschatka.

Hair very long and woolly, and not lengthened into a mane on the

neck. General colour grizzly brown. An indefinitely bounded patch on the face below the eyes, and all four limbs anteriorly rich uniform dark brown. Space round the muzzle, upper and under lip, rump, and posterior part of the haunches, centre of the belly, and the limbs posteriorly pure white. The white on the posterior parts of the limbs gives place very suddenly to the brown of their anterior surfaces. The white of the rump does not surround the tail, which on its upper surface is darker than the back. Ears and tail very short.

Horns in form closely resembling those of *Ovis montana*. Frontal and nuchal surfaces convex. Orbital surface flat. Fronto-nuchal and nuchal edges very greatly rounded. Fronto-orbital edge strongly defined, a deep groove lying between it and the orbital surface. The terminal curve of the horns well developed, and directed upwards and outwards.

Skull remarkably short and broad, and strongly anchylosed. A shallow anteorbital fossa. Length from between horns to end of præmaxillæ 10", its greatest width across the orbits  $6\frac{3}{4}$ "; height at the shoulder 37"; length of horns round curve 33", their circumference  $12\frac{3}{4}$ ".

*Adult* ♂. Mus. Strassburg. Only differs from the former in being considerably paler in colour. Length of horns 27"; their circumference  $13\frac{1}{2}$ ".

*Adult* ♀. Mus. Lugd. Is darker than the male, and has short compressed horns about 9" in length. The distribution of colour is the same as in the male.

*Range*.—Kamtschatka (*Eschscholtz*); Stanovoi Mountains, as far south as the sources of the Utschur (*Middendorff*). Besides the above locality, Middendorff convinced himself of the occurrence of a Wild Sheep at about 67° N. lat., eastward from Yenisei, in the Sywerma Mountains, near the sources of the river Cheta; and doubtless referring to the same species, Mr. Severtzoff writes (*l. c.* p. 86):—"Very near to *Ovis nivicola* is another, as yet not properly identified, Sheep from North Siberia, from the mountains which separate the basins of the rivers Nyjnaya and Tungasca, tributaries of the Yenisei, from that of the Hatauga and Piaseina. Several perfect specimens of this animal were obtained by Mr. Schmidt's expedition for the Zoological Museum of the Academy of Sciences."

This species has by many naturalists been considered identical with *Ovis montana* of North America. We have, however, no hesitation in considering it distinct from that species. In the extraordinary breadth and shortness of its skull *Ovis nivicola* differs most markedly from all the allied species.

#### *List of specimens examined.*

a. This specimen was brought by Colonel J. E. Gordon "from the Thian-Shan range towards Russian Turkestan" (*in litt.*). It represents a remarkably fine adult male in winter coat. The fronto-orbital and fronto-nuchal edges of the horns are definite, the latter the most marked. All three surfaces very flat.



*b.* Sent home by Captain Biddulph from the Yarkund Expedition. It is also a male in winter coat, but is a darker-coloured specimen than *a*, the snow-white mane so strongly marked in the former being in this specimen much tinged with rufous. The horns are more battered, but the edges appear to have been similar. The orbital surface slightly convex. In both this and the preceding specimen the tail is entirely surrounded by pure white, its dorsum having a very thin dark line.

*c.* A single horn in the College of Surgeons (No. 3773 in catalogue, type of *O. sculptorum*, Blyth, P. Z. S. 1840, and Annals and Magazine Nat. Hist. 1841, pl. 5. figs. 3 & 4), which we, with some hesitation, follow Mr. Severtzoff's example in referring to *O. karelini*. Median axis directed sharply inwards; terminal axis running at first parallel with the basal axis, its extremity, from the unusual length of the horn, directed downwards. Fronto-orbital edge rounded for its entire length, although the frontal and orbital surfaces are well defined; nuchal edge rounded at the base, becoming much sharper at the tip. Frontal surface slightly convex for its entire length; orbital surface convex for about half its length, and then becoming gradually concave; nuchal surface flat for about half its length, then becoming also gradually concave. The horn is curved so tensely as to cause the nuchal edge to form one complete circle, and part of the segment of another.

*d.* A mounted specimen at Berlin.

*e.* A perfect skull and horns, brought home by Dr. Bellew from the Yarkund Expedition. All the surfaces are remarkably flat, the edges rounded, but distinctly marked.

*f.* This magnificent pair of horns on the frontal bones was sent home from the Pamir range by Colonel J. E. Gordon, who writes:—"I brought the specimen myself from the Pamir range. I could have got a perfect *new* head of *Ovis poli*, 61 inches; but I preferred to take the old head, 65½ inches, believing that no one would credit me if I merely *told* of the latter. I could not carry both."

The edges of the horns are rounded for the first half of their length, especially the fronto-orbital. The surfaces are all slightly convex along the basal curve of the horns, but become flatter in the median curve, the nuchal surface becoming concave in the terminal curve.

*g.* This specimen (frontlet and horns) was also sent home by Colonel Gordon from the same locality. It belongs to a younger animal than the preceding. The fronto-nuchal edge is very prominent, the fronto-orbital edge rounded, and the nuchal edge sharply defined. The nuchal surface is concave, the frontal surface flat, and the orbital surface slightly convex.

*h.* Imperfect skull and horns, brought home by Captain Chapman during the Yarkund Expedition, also from the Pamir range. It represents an animal about the same age as *g*, and agrees with it in every particular.

*i.* Perfect skull (excepting lower jaw) and horns of a young male, probably about 2 years and 3 months old, procured through our

brother Captain Brooke, 92nd Highlanders, direct from the Pamir range.

*j.* Frontlet and horns in the College of Surgeons (no. in catalogue 3773 *a*). They were presented by Mr. Sclater, who gives the following particulars (P. Z. S. 1860, p. 443):—"This is one of several pairs of horns brought back by Lieut. Wood in 1838, on his return from his journey to the sources of the Oxus, when detached from Sir Alexander Burnes's mission to Cabool. Having been unaccountably neglected, and thrown out into the open air at Loodianeh to perish, they were rescued by Col. Stedman in 1843, and presented to Major W. E. Hay, who brought them home in 1858."

*k.* This specimen, an imperfect skull and horns, formed the original type of *O. poli*, Blyth (P. Z. S. 1840; Ann. & Mag. Nat. Hist. 1841, pl. v. figs. 1 & 2), and is now preserved in the collection of the East-Indian Museum at Kensington. The orbital surface of the horns is convex at the base, becomes flat and more or less concave towards the extremity; the frontal surface is flat, and the nuchal surface flat at the base, becoming gradually concave. The fronto-nuchal edge is sharp, the fronto-orbital edge rounded, and the nuchal edge sharp; all three edges are strongly marked towards their extremities.

*l.* Frontlet and horns sent home by Sir Douglas Forsyth, and now in the East-Indian Museum, Kensington. It agrees in all particulars with the preceding specimen (*k*).

*n.* Stuffed specimen in the British Museum, received from Brandt, the only locality given being Siberia. The horns are very massive, with deep annulations, their frontal and nuchal surfaces rounded, and the fronto-orbital edge almost obsolete. The terminal curve strongly developed, and turning boldly outwards.

*o.* Mounted specimen in the Museum at Leyden.

*p.* Mounted specimen in the Museum at Amsterdam.

*u.* Perfect specimen, skin, skull, and horns, in Colebrooke Collection. It was brought home by Captain Chapman, and was killed within 30 or 40 miles of Leh, during the winter of 1873. Frontal and orbital surfaces slightly convex; nuchal surface convex at the base, becoming gradually flatter towards the extremity. All three edges rounded. A slight groove runs along the orbital surface immediately below the fronto-orbital edge.

*v.* A perfect skull (except lower jaw) in the British Museum.

*w.* Skull in the College of Surgeons (no. 3772 in catalogue).

*x.* A remarkably fine specimen in the collection of Lady Mayo. The annulations in the horns are very strongly marked; the fronto-orbital edge is rounded, the fronto-nuchal edge very definite. Orbital surface convex, frontal surface flat, nuchal surface convex at base, becoming gradually concave towards the extremity.

*y.* Skull and horns in the East-Indian Museum, presented by Mr. Hodgson. The orbital surface is flat, the frontal surface slightly concave, and the nuchal surface convex. The three edges are distinctly marked, the fronto-orbital and fronto-nuchal ones rounded. The median axis is directed inwards; the terminal axis very short, and directed forwards.

z. Skull and horns in East-Indian Museum, presented by Mr. Hodgson. The orbital surface slightly convex at base, but becomes gradually flat; frontal surface slightly convex; the nuchal surface convex. The fronto-nuchal and nuchal edges strongly marked; the fronto-orbital edge rounded. Terminal axis directed upwards, outwards, and forwards.

*Conclusion.*—M. Alphonse Milne-Edwards, in his 'Recherches pour servir à l'Histoire Naturelle,' has indicated the probability of the Himalayas having been the birthplace of the Caprine Antelopes; the same conclusion has suggested itself to our minds with reference to the Argali in studying their present distribution and differentiation. Taking the outlying forms of the group as regards geographical distribution, we find that we are led, either through intermediate or allied forms, to the great mountain-chain which forms the watershed between the Indian region and Central Asia. *Ovis poli* of the Pamir, separated from *Ovis hodgsoni* of Thibet by the impassable glacier system of the Karakorum, which stretches over three degrees of longitude, from Hunza Nagar on the west to the Karakorum Pass on the east, is connected with that species by species of intermediate characteristics, which are distributed over intermediate ranges. The succession would be as follows:—*Ovis poli*, Pamir; *Ovis karelini*, Thian Shan as far eastward as Tengri Khan; *Ovis ammon*, the Altai from Tengri Khan as far as the Sea of Baikal on the east, and then southward over the great ranges at the sources of the Hoang-ho and Yang-se-kiang, its exact range in this latter direction being as yet very imperfectly known; *Ovis hodgsoni*, Nepaul and Little Thibet. With reference to the three imperfectly known species, *Ovis brookei*, *Ovis heinsi*, and *Ovis nigrimontana*, nothing at present can be conjectured. *Ovis nivicola* of the Stanovoi Mountains and *Ovis montana* of North America, the two most isolated forms as to distribution, possess characters in common in which they differ markedly from all the other species; and this fact, the facts of peculiarity of form and isolation of distribution being found side by side, appears to strengthen the probability of the hypothesis that these two species are the offshoots of the group whose early home and birthplace was in the Himalayas. The probability of this hypothesis is also strengthened by its applicability to the differentiation and distribution of the smaller forms of Sheep. *Ovis musimon* of Corsica and Sardinia, and *Ovis ophion* of Cyprus, are undoubtedly very closely allied to *Ovis gmelini* (= *Ovis orientalis*) of Asia Minor, and appear to us to be nothing but insular derivatives of that species. *Ovis gmelini*, on its part, so closely resembles *Ovis vignei* of Ladak that the horns of the two species cannot be distinguished apart. The exact distribution of this form is not perfectly known; but we possess a very fine specimen from Ararat, and Mr. Blanford's collection contained a male specimen from the Elburz Mountains, south of the Caspian Sea. Lastly, the sharply triangular-horned Sheep, of which *Ovis cycloceros* is the type, are distributed from the mountains of Southern Persia and Beloochistan, through the Sulimani and Salt ranges, as far north as Thibet; and we possess specimens from these different ranges.



November 2, 1875.

Dr. E. Hamilton, V.P., in the Chair.

The Secretary read the following reports on the additions to the Society's Menagerie during the months of June, July, August, and September 1875:—

The total number of registered additions to the Society's Menagerie during the month of June was 162, of which 49 were by birth, 54 by presentation, 45 by purchase, and 14 were received on deposit. The total number of departures during the same period, by death and removals, was 116.

The most noticeable additions during the month of June were as follows:—

1. A not quite adult Cassowary, received June 7th, having been brought from New Zealand by Dr. Hector, and presented to the Society by The Right Honourable Sir James Fergusson, Bart., F.Z.S., lately Governor of the Colony. This bird was obtained in 1873, when quite young, along with another similar specimen by the officers of H.M.S. 'Basilisk' from the natives of Tonan or Cornwallis Island, a small island in Torres Straits, four miles distant from the south coast of New Guinea, and seventy miles from the opposite coast of Cape York. The natives are said to have captured the birds on the coast of New Guinea. The present specimen was conveyed in the 'Basilisk' to Wellington in July 1873, and had remained there ever since. When brought to Wellington it was supposed to have been about nine months old.

It appears to be most like the Australian Cassowary (*Casuarus australis*), but differs in its stronger legs and stouter form, as also in the throat-wattle being single and mesial, but divided at the extremity, as shown in the accompanying figure (Plate LVIII.). I believe it to be probably of the same species as that of the Aroo Islands, which I have lately described as *Casuarus beccarii* (*antea* p. 87).

2. A Black Wood-Hen (*Ocydromus fuscus*) from Snares Island, south of New Zealand, presented by Dr. G. Hector, F.R.S., C.M.Z.S., June 7th, being the first example of this species of *Ocydromus* which we have received.

3. A young male brown Indian Antelope of the southern form, in which the front pair of horns are barely apparent (*Tetracerus subquadricornutus*, Elliot \*), purchased June 8, 1875. Dr. Jerdon does not distinguish this animal from the northern *T. quadricornis*; but Sir Victor Brooke tells me he thinks that the two forms must be kept separate.

4. A female Grant's Gazelle (*Gazella granti*, Brooke) from East Africa, presented by Dr. John Kirk, C.M.Z.S., June 10th.

The arrival of a living example of this fine Gazelle, which has

\* *Antelope subquadricornutus*, Elliot, Madras Journ. x. p. 225, pl. 4. fig. 2; *Tetracerus subquadricornutus*, Gray, P. Z. S. 1850, p. 117.

only recently been described by Sir Victor Brooke from drawings \*, is of great interest. Unfortunately the animal was in a very feeble state when received, and died very shortly. I now exhibit the mounted specimen (Plate LIX.). The height of this animal at the shoulders is 28 inches, the length of the horns 7.25 inches.

I have also to call attention to the breeding of the Spotted-billed Duck of India (*Anas pæcilorhyncha*) in these Gardens, which took place for the first time in June last. We received our first males of this beautiful species from the Babu Rajendra Mullick in August 1868 (see P. Z. S. 1868, p. 649). In May 1872, five females were presented by Mr. E. Buck (see P. Z. S. 1872, p. 729). The pairs thus formed, however, never bred until the present year, when two young birds were hatched by one female on the 2nd of June, and seven by another on the 14th of the same month. The male and female of this duck are so much alike that (as I am informed by Mr. Clarence Bartlett, the Assistant Superintendent, who has charge of the breeding Anatidæ) the only certain means of distinguishing the sex is by the note. The nest and number of eggs also much resemble those of *Anas boschas*. The young are undistinguishable from the young of the same species.

I exhibit specimens of the eggs.

The registered additions to the Society's Menagerie during the month of July were 202 in number; of these, 37 were acquired by presentation, 113 by purchase, 1 by exchange, 30 by birth, and 21 received on deposit. The total number of departures during the same period by death and removals was 94.

The most noticeable additions during the month were:—

1. A pair of Giant Tortoises (*Testudo indica*) purchased July 6. These Tortoises are originally from Aldabra Island in the Indian Ocean, but have been kept (the male, it is said, for upwards of 70 years) in captivity in the Seychelles, and have been forwarded thence by Mr. C. S. Salmon, the Chief Commissioner for the Islands, under the care of Dr. Brooks, Government Medical Officer. The shell of the male measures about 4 ft. 1 in. by 3 ft. 1 in.; and his weight is estimated at 800 lbs. We have to thank Dr. Günther (who arranged with Mr. Salmon for the transmission of these last relics of an extinct race to this country) for allowing them to remain, so long as they live, in our Garden. When they die they are to be transferred to the British Museum†.

2. A female Sumatran Rhinoceros (*Rhinoceros sumatrensis*) deposited July 14 by Mr. C. Jamrach. This animal seems to resemble very nearly the individual of the same species formerly in our Gardens, which died in 1872. It is stated to have been captured in the territory of Johore, Malay peninsula.

3. A collection of small birds from S.E. Brazil, purchased July 19, amongst which are specimens of two beautiful little Tanagers

\* See P. Z. S. 1872, p. 601, pl. xli.

† See Dr. Günther's remarks on these Tortoises and their allies. Ann. Nat. Hist. ser. 4, vol. xiv. p. 311 (1874), and Nature, xii. pp. 238 & 259.

(*Calliste festiva* and *Euphonia pectoralis*) new to the collection, and, so far as I know, never previously received alive.

4. A very fine male Chimpanzee (*Troglodytes niger*), presented by Captain Lees, Governor of Lagos, July 19. The first set of teeth have been already shed, which is rarely the case in examples of the Chimpanzee brought to this country.

5. An Electric Silurus (*Malapterurus beninensis*) from West Africa, purchased July 21st, being the first example of this singular fish brought to our Gardens. On touching its belly with the finger a slight electric shock is at once given forth. The fish is about 5 inches long.

6. A young female Tora Antelope (*Alcelaphus tora*) from Upper Nubia, purchased July 22nd, being the first example of this eastern form of the Bubal which has reached us alive. The colour and shape of the body appear to be nearly identical with those of the Bubal; but the horns of the adult male, (as I have shown, P. Z. S. 1873, p. 762) are very different.

7. A young male Wild Sheep, apparently *Ovis cycloceros*, presented July 28th, by Commander Edmund St. J. Garforth, R.N. of H.M.S. 'Philomel,' who writes to me that he obtained it in Muscat, on the shores of the Persian Gulf, which I should not have supposed to be within the range of this species.

The total number of registered additions to the Society's Menagerie during the month of August was 94; of these, 52 were acquired by presentation, 12 by purchase, 13 by birth, 1 by exchange, and 16 received on deposit. The total number of departures during the same period by death and removals was 94.

The most noticeable additions during the month were:—

1. A young female Manatee (*Manatus americanus*), deposited August 6th by Mr. R. Swain, of Demerara, and subsequently purchased for £150. This animal was conveyed to England, on board the S.S. 'Blenheim,' Captain Robinson, in a large wooden tank slung upon a horizontal pole, and was fed during the voyage on the leaves of a large aquatic plant resembling the water-lily (*Nymphaea*), shipped for the purpose. It was about three weeks on the voyage. On its arrival in the Gardens, it was placed in one of the shallow concreted ponds near the Sea-lion's basin, and fed on lettuce and vegetable marrow. It lived in apparently good health until September 7th, when it died very suddenly. Mr. Garrod is preparing some notes upon this interesting animal, which is the first of the species that has actually reached us alive, although Mr. C. Bartlett nearly succeeded in bringing us one from Surinam in 1866\*.

2. Two young Gannets, probably the young of the Brown Gannet or Booby (*Sula fusca*), but still partly in the down plumage, and therefore not certainly determinable. These birds were obtained from Port Lemon, Costa Rica, by J. C. Hussey, and presented by that gentleman August 16th.

3. A Woodford's Owl (*Syrnium woodfordi*) from Natal, presented

\* See Trans. Zool. Soc. viii. p. 192.

August 16th by Mr. W. E. Oates, being the first example we have received of this scarce bird.

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The total number of registered additions to the Society's Menagerie during the month of September was 104; of these, 43 were acquired by presentation, 22 by purchase, 16 by birth, 8 by exchange, and 15 were received on deposit. The total number of departures during the same period by death and removals was 111.

The most noticeable additions during the month were as follows:—

1. A White-faced Owl (*Sceloglaux albifacies*) from New Zealand, purchased 3rd September 1875, new to the collection.

2. A wild Dog, presented by Mr. Mumford, 7th Sept. 1875. This animal was formerly in Manders's Travelling Menagerie, and was sold when that collection was dispersed by auction in the Agricultural Hall in August last, to Mr. Mumford, who has obligingly presented it to the Society.\* Its origin is unknown; but, as far as can be ascertained from examination of the living specimen, it would appear to be an adult male of the Wild Dog of Sumatra (*Canis rutilans*, Temm.). It has been placed in the same cage along with its near ally, the female Indian Wild Dog (*Canis primævus*), received from Lord Northbrook in March last.

3. An American Darter (*Plotus ankinga*), from South America, purchased 30th September, 1875. The Society now possesses two living examples of this interesting bird. The first one, obtained 28th December, 1872 (see P. Z. S. 1873, p. 2, where there is an excellent drawing of this bird), is now in adult plumage; the last arrival is in immature dress.

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The following translation of a letter addressed to the Secretary by M. L. M. D'Albertis, C.M.Z.S., was read:—

“Yule Island, May 24, 1875.

“Since the 14th of March I am on this island, at the south of New Guinea, from which it is divided by a few miles of sea only. I have already made several excursions on the Papuan coast, and succeeded in penetrating a little way inland—not really far, it is true, but far considering the circumstances of my situation, and the country in which I am.

“First of all, I may observe that the general aspect of the country resembles that of the north of Australia much more than the north of New Guinea. On the coast the beautiful forest-trees are wanting, and *Eucalypti* abound in their place, and there are large open spaces covered only with long grasses and small shrubs or “scrub,” as you call it. There are also lagunes. The climate is dryer than in the north. When I ascended the mountains a little and penetrated the interior, the Australian plants disappeared, and those more specially Papuan were again found. In the same way as the flora, the fauna of the coast shows much affinity to that of Northern Australia; and in one of the lagunes I have seen in abundance *Parra gallinacea*, *Porphyrio melanotus*, and a species of *Lobivanellus*, of which I cannot tell

the name certainly, as I have not yet obtained specimens. Moreover, at early dawn and after sunset I have several times heard the notes of a *Dacelo* which might be *D. leachi*; and in this island for some time *Scythrops australis* was common, while on the opposite coast of New Guinea I obtained good examples of *Chlamydodera cerviniventris*. I could add the names of many other Australian species. On the other hand, on the mountains, besides *Paradisea raggiana*, there are to be found *Cicinnurus regius*, *Pitta novæ guineæ*, *Eupetes cærulescens*, and *Campephaga aurulenta*. Of the last I obtained the female, which differs from the male in having the throat cinereous. But these are not the only species which give a Papuan tint to the mountain-birds; for there is also to be met with *Lophorina atra*, of which I have seen many feathers used by the natives for ornament, as also of *Sericulus aureus*, called by the natives "*Horobora*." Certainly along with the *Sericulus* and *Lophorina* would be found the other Paradise-birds that in the north inhabit the same localities as these species.

"Serpents I find much more numerous here than in the north of New Guinea, especially the venomous ones, and not only of Australian genera, but even of Australian species. Of *Acanthophis antarectica* I have obtained two examples, which differ slightly from each other, and very much from the Australian form; but I take it for the same species. The Coleoptera and Lepidoptera are, like the birds, near the coast more Australian than Papuan; and the reverse is the case in the interior. But *Pieris aruna*, which is so common at Cape York, I have found also on the mountains.

"Up to the present time I have not formed an exact idea as to the Mammals, but am inclined to believe that they are very scarce. I have only obtained a *Cuscus* (probably one of many varieties of *C. maculatus*), a *Belideus*, a few species of insectivorous Bats, a *Pteropus*, two Bats, and the so-called *Sus papuensis*, of which last I have not seen two alike amongst a hundred. The *Halmaturus luctuosus* is very common, inhabiting the mountains as well as the plain—but always where the forest is most dense. It abounds on the lower hills, and forms one of the principal sources of food for the natives, who capture it in numbers in strong nets. I have had the opportunity of examining a large number of this species, and find them identical with the individual described by me in the 'Proceedings'\*, which, I hope, is still living in the Society's Gardens. But upon further examination I find that the canine teeth, which did not exist in the individual described by me at the time of my description and even subsequently, are, on the contrary, always present in examples of every age which I have recently examined here. Consequently, after considering its dentary system, I have come to the conclusion that this species is not correctly placed in the genus *Halmaturus*, but ought to be referred to the genus *Dorcopsis*, to which, as it appears to me, its principal generic characters assimilate it rather than to any other genus of Macropodidæ. The Kangaroos which Dr. Beccari sent from the Aroo Islands to the Museo Civico of Genoa may also belong to the genus *Dorcopsis*, but are certainly distinct from *D. luctuosa*, as I think

\* P. Z. S. 1874, p. 110; see also P. Z. S. 1874, p. 247, pl. xlii.

the present animal should now be called. I have also obtained a second species of Kangaroo, which I believe to be new, but have not been able to determine accurately, from the specimen being immature and its dentition imperfect\*. The adult animal, of which I have seen several individuals in the forest, is larger than *D. luctuosa*.

"In the river, along which I penetrated into the interior some way, Crocodiles were abundant. In two hours I saw nine, large and small, but only one of really considerable size. Here also near this island on calm days I have often seen them; and, judging from their heads, which they thrust out of the water, they must be of large size. They seem to have fixed places in which they pass many hours of the day; for passing many times I always see them at the same posts.

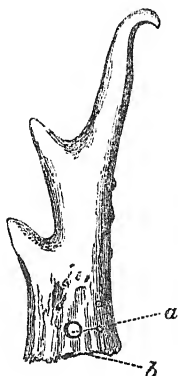
"I was rather fortunate in my excursion into the mountains; for I found *Paradisaea raggiana*, and obtained some beautiful specimens in full dress. In its voice, in its movements, and in its attitudes, it perfectly resembles the other species of the genus. It feeds on fruit; and I could find no trace of insects in the seven individuals which I prepared. It inhabits the dense forest, and is generally found near the ravines—perhaps because the trees on the fruit of which it feeds prefer the neighbourhood of water. The female is always smaller in size than the male; and I find this sex less abundant, because, as I believe, it is the season of incubation. The female is more like the same sex of *P. apoda* than that of *P. papuana*. The young male is like the female, but often recognizable by having distinguishable traces of the yellow collar which in the old male divides the green of the throat from the breast-feathers. The irides are of a rather bright yellow, and the feet lead-colour with a reddish tinge. The long flank-feathers in individuals recently killed have a very bright tint, which they lose in a few days—even in a few hours. The two middle tail-feathers are filiform, as those of *P. apoda* and *P. papuana*, and in no stage of development resemble those of *P. rubra*. These two feathers are not so long as in *P. apoda*, and about equal to those of *P. papuana*. Like its sister species, *P. raggiana* is an inquisitive bird, and often approaches from branch to branch within a few yards of the hunter, and remains motionless for some seconds to observe its pursuer, stretching out its neck, flapping its wings and emitting a peculiar cry, upon the sound of which other individuals come forward to join it. When one is wounded and cries out, many others come forward as if to protect it, and approach quite near, descending to the lowest boughs. The adult males frequent the tops of the highest trees, as Mr. Wallace observed in the other species, and as I also remarked in my former expedition. As regards the nidification I have as yet obtained no information."

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A letter was read from Mr. Walter J. Hoffman, dated Reading, Pennsylvania, U.S.A., July 15th 1875, containing a sketch of a horn of an American Pronghorn (*Antilocapra americana*) with a double prong.

\* [Probably *Macropus papuensis*, lately described by Peters and Doria from M. d'Alberty's specimens, Ann. Mus. Gen. vii. p. 344.—P. L. S.]

The sketch had been taken from the original at the Grand-River Indian Agency, Dakota Territory, while Mr. Hoffman was stationed there as Surgeon in 1872. The horn had been used as a charm by one of the chiefs of Sioux Indians; and Mr. Hoffman had been informed by him that both horns of the animal were alike. The one in



Horn of *Antilocapra americana*, with double prong.  
*a*, perforation for cord; *b*, artificial edge, cut by wearer.

question had been perforated and attached to a buckskin thong, and in this manner worn about the neck. The specimen had been afterwards purchased by the Hospital Steward, who had it in his collection still when Mr. Hoffman wrote.

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Mr. Sclater read a letter from Captain J. Moresby, R.N., stating that the young example of *Casuarus uniappendiculatus* presented by him to the Society on the 25th August, 1874, had been obtained on the 29th of May, 1874, on the western extremity of New Guinea, at a place called "Threshold Bay" in lat.  $1^{\circ}$  south and long  $132^{\circ}$  east (approximately), about 20 miles to the north of the island Salawatti.

The statement respecting the origin of this bird given on Dr. Bennett's authority (P. Z. S. 1875, p. 84) was therefore incorrect, the bird there alluded to by Dr. Bennett under the name *Casuarus uniappendiculatus* having been the example of *Casuarus beccarii* above referred to (p. 527), which had been obtained by the 'Basilisk' on a previous occasion.

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The following papers were read:—

1. Notice sur l'*Elopichthys dahuricus*. Par P. BLEEKER,  
F.M.Z.S.

[Received June 22, 1875.]

(Plate LX.)

M. le docteur G. E. Dobson a bien voulu avoir l'obligeance de me faire parvenir, par l'entremise de M. Francis Day, un poisson de Chine, provenant du fleuve Yang-tse-kiang, et faisant partie des collections du Netley Museum of the Army Medical Department. Le poisson avait été étiquetté "*Opsariichthys*," et M. Dobson me pria d'en faire la description. Le poisson est sans aucun doute un *Elopichthys*, et de l'espèce figurée par Basilewski sous le nom de *Naseus dahuricus*.

L'espèce du poisson du Netley Museum n'est donc pas inédite, mais il reste incertain si le *Naseus dahuricus*, Bas., soit spécifiquement distinct ou non de l'*Elopichthys bambusa* ou du *Leuciscus bambusa*, Rich.

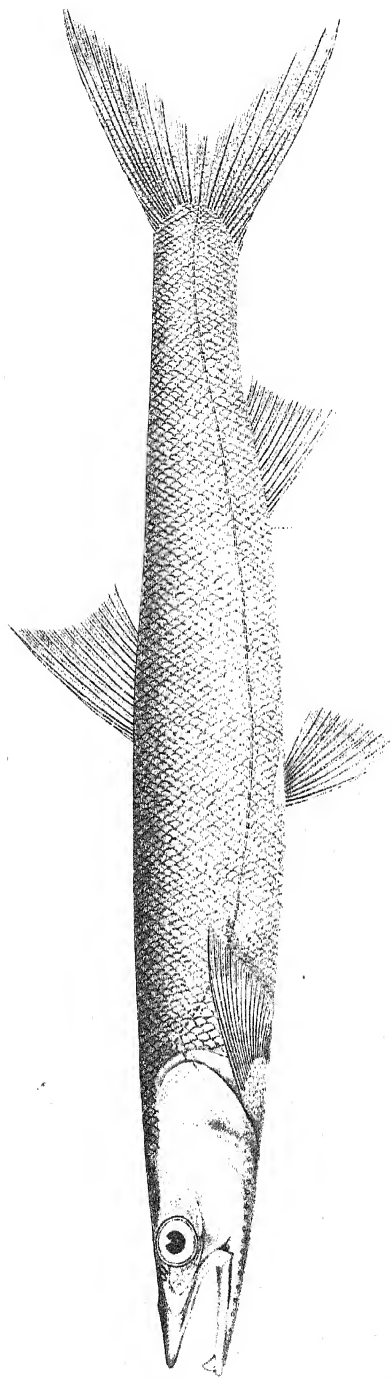
M. Günther cite le *Naseus dahuricus* comme synonyme du *Leuciscus bambusa*, mais seulement avec un point de doute. Ce point de doute me semble bien justifié et je pense qu'on ait affaire ici à deux espèces bien distinctes.

Les figures publiées par Basilewski et Richardson présentent une physionomie fort différente. Celle du *Leuciscus bambusa* montre la mâchoire inférieure plus longue que la supérieure, et la queue beaucoup moins haute que celle du *Naseus dahuricus*, mais étant prise sur un individu adulte et empaillé, il est probable qu'elle ne rende pas exactement la forme de la queue.

Les formules des nageoires aussi sont différentes pour les deux formes, mais il est probable que les rayons n'aient pas été comptés exactement. Les formules données par Basilewski, Richardson et M. Günther ne cadrent pas entre elles, ni aussi avec celles que je trouve sur l'individu du Netley Museum. M. Günther a examiné le type même du *Leuciscus bambusa*. Il en donne la formule des écailles: L. lat. ca. 100, L. transv.  $\frac{20}{5}$ , en y ajoutant, dans le texte de la diagnose, "there are nine longitudinal series of scales between the lateral line and ventral fin." Cette formule est tout différemment rendue sur la figure du *Leuciscus bambusa*; mais si celle de M. Günther est exacte le *bambusa* ne peut pas être de la même espèce que le *dahuricus*. Quant au *Basilus (Opsarius) bambusa*, Kner, l'auteur en dit expressément que les individus de Shanghai qu'il en a eus sous les yeux avaient plus de ressemblance avec la figure du *Naseus dahuricus* qu'avec celle du *Leuciscus bambusa*.

En attendant qu'une comparaison de l'individu du Netley Museum au type Richardsonien puisse faire juger positivement, je considère le *dahuricus* et le *bambusa* comme espèces distinctes. On verra par la figure ci-jointe, et parfaitement exacte, qu'elle répond beaucoup mieux à la figure du *Naseus dahuricus* qu'à celle du *Leuciscus bambusa*.





ELOPICHTHYS DAHURICUS



## ELOPICHTHYS DAHURICUS. (Plate LX.)

Elop. corpore elongato compresso, altitudine 6 circ. in ejus longitudine absque,  $7\frac{1}{2}$  circ. in ejus longitudine cum pinna caudali; latitudine corporis  $1\frac{3}{4}$  circ. in ejus altitudine; capite acuto  $3\frac{3}{4}$  circ. in longitudine corporis absque,  $4\frac{2}{3}$  circ. in longitudine corporis cum pinna caudali; altitudine capitis 2 circ., latitudine capitis 3 circ. in ejus longitudine; oculis diametro 6 circ. in longitudine capitis, diametro  $1\frac{1}{2}$  circ. distantibus; linea rostro-frontali rectiuscula; rostro acuto cum maxilla oculo duplo circ. longiore, apice ante medium oculum sito, multo longiore quam basi lato; naribus ante oculi marginem superiorem perforatis, septo gracili valvuliformi separatis; osse suborbitali anteriore oblique pentagono apice sursum spectante; ossibus suborbitalibus ceteris gracilibus longioribus quam latis; maxillis subæqualibus acie scabriusculis; maxilla superiore non protractili, sub oculi dimidio anteriore desinente, postice curvata, parte intermaxillari prærostrali conica dimidium rostri totius longitudinem efficiente; maxilla inferiore superiore vix brevior, symphysis processu conico elevato subhamata; labiis gracilibus, superiore sulco longe ante apicem maxillæ desinente, inferiore sulco symphysim subattingente, præoperculo subrectangulo, angulo obtuse rotundato, limbo postero-inferiore poris conspicuis uniseriatis; operculo lævi minus duplo altiore quam longo, margine inferiore rectiusculo; osse scapulari triangulæ obtuso; dentibus pharyngealibus triseriatis, compressiusculis, leviter uncinatis, 2, 4, 5/4, 4, 2, longioribus; facie masticatoria concava gracili; dorso humillimo; cauda parte libera postanali minus duplo longiore quam alta, parte gracillima altitudine 4 circ. in longitudine dorsalem inter et basin pinnae caudalis; squamis non vel vix striatis, 100 circ. in serie longitudinali angulam aperturæ branchialis superiorem inter et basin pinnae caudalis, 22? circ. in serie transversali basin pinnae ventralis inter et dorsalem, quarum 15 vel 16? lineam lateralem inter et dorsalem; linea laterali singulis squamis tubulo simplici notata, mox post scapulam valde descendente, lineæ ventrali triplo magis quam lineæ dorsali approximata; cauda postice sursum curvata et media basi pinnae caudalis desinente; pinna dorsali medio aperturam branchialem inter et basin caudalis inserta, capite plus duplo brevior, corpore non humiliore, acuta, emarginata, antice quam postice plus triplo altiore; pectoralibus lineæ ventrali approximatis, subhorizontaliter insertis, capitis parte postoculari non vel vix longioribus; ventralibus paulo ante dorsalem insertis, anali quam basi pectoralium paulo propinquioribus, acutis, pectoralibus paulo brevioribus?; anali longitudine et forma dorsali æquali sed ea humiliore; caudali profunde incisa, lobis acutis, cupite paulo brevioribus; colore corpore superne viridi, lateribus et inferne argenteo; iride argentea vel flavescente, pinnis flavescentibus vel ex flavescente roseis.

B. 3. D. 3/11 vel 3/12. P. 1/19 vel 1/20. V. 1/9.

A. 3/12 vel 3/13. C. 9/17/8 lat. brev. incl.

- Naseus dahuricus*, Bas. Ichth. Chin. bor., Nouv. Mém. Moscou, x. p. 234.  
*Naseus dauricus*, Bas. ibid. tab. 7. fig. 1.  
*Elopichthys dauricus*, Blkr. Act. Soc. Sc. Ind. Neerl. vii. Cyprius. p. 286.  
*Basilus (Opsarius) bambusa*, Kner, Zool. Reis. Novara, Fisch. p. 357.  
*Hab.* Sina, in flumine Yang-tse-kiang (*test. clar. Dobson*). Longitudo speciminis descripti, 235'''.

La Haye, 20 Juin, 1875.

## 2. Description of a new Species of *Carinifex* from California. By EDGAR A. SMITH, F.Z.S.

[Received June 23, 1875.]

A very peculiar form of *Planorbis*, from California, was described by Mr. Isaac Lea in the Proceedings of the Academy of Philadelphia, 1854, p. 51, under the name *P. newberryi*.

Subsequently Mr. G. Binney deemed this so remarkable a shell as to merit generic rank, and consequently he proposed to distinguish it by the name *Carinifex* (see Cat. North-American Pulmonata, Dec. 9, 1863).

The same idea appears to have occurred to Mr. Lea himself; for in January of the succeeding year (Proc. Acad. Philad. Jan. 1864) he describes his species with the generic title of *Megasystropha*.

In neither instance is a diagnosis given; but in the American Journ. Conchol. i. 1865, p. 50, Binney describes *Carinifex* and figures *C. newberryi* on pl. 7. figs. 6, 7.

He also mentions the existence of a second species, *C. breweri* of Newcomb, and observes, "the latter (*C. breweri*) may prove but a variety of the former" (*C. newberryi*).

Whether this be the same as the following species or not I cannot say; but all search to find the description of any species entitled *C. breweri* has been in vain.

### CARINIFEX PONSONBII, sp. nov.

*Testa subdiscoidalis, tenuis, latissime et profundissime umbilicata, corneo-alba, epidermide fugaci tenuissima pallide olivacea induta; anfractus 5, convexiusculi, rapide accrescentes, superne paululum suturam infra obsolete angulati, incrementi striis perarcuatis exilissime sculpti, sutura profunda discreti; spira parum supra anfr. ultimum elevata; anfr. ult. maximus, superne late sed minime profunde excavatus, infra excavationem aliquanto carinatus, infra carinam leviter convexiusculus, inferne circa umbilicum subobtusè carinatus; apertura magna, triangularis, inferne subcanaliculata, superne leviter ascendens;*

*peristoma continuum, ad margines superiorem labralemque aliquanto expansum.*

Diam. max. 20 mill. Diam. min. 15. Alt. 16.

*Hab.* California.

This very remarkable species was collected in California by Lord Walsingham; and two specimens were presented to the British Museum by Mr. J. H. Ponsonby—a most enthusiastic conchologist, with whose name I feel much pleasure in associating the species.

It has but one relation of any proximity, namely *C. newberryi*, Lea. From this it differs in being of a thinner and lighter build, in



*Carinifex ponsonbii.*

the more rapid increase of the whorls, and consequently in the proportionally much larger size of the last in comparison with the penultimate. *C. newberryi* has the upper surface of the whorls broadly flattened and then acutely keeled and angulated, whereas in the present species they are rather convex, lack the carination, and display but the faintest approach to an angulation, and this is situated near the *upper* and not the *lower* suture. Again, the mouth of the latter species ascends a little on the body-whorl; in the former it descends a trifle. Finally, Lea's shell is much more coarsely striated, and clothed with a strong yellowish-olive epidermis, whereas that which invests the present species is very thin and of a very pale olive tint. On each side of the rounded keel, encircling the umbilicus, there is a shallow depression.

### 3. Remarks on the Genus *Alaba*, with the Description of a new Species. By EDGAR A. SMITH, F.Z.S.

[Received June 23, 1875.]

The genus *Alaba* was first characterized by Messrs. H. and A. Adams in the 'Genera of Recent Mollusca,' p. 214, and there considered as a subgenus of *Cerithiopsis*.

Subsequently it was raised to the rank of a separate genus and removed by A. Adams (see *Annals & Mag. Nat. Hist.* 1862, x. p. 294) to the subfamily Litiopinæ.

Here the shells included in the group are described "anfractibus plicatis seu varicosis, vertice submammillato. Apertura ovata, labio sæpe vix truncato." No mention is made of the nature of the operculum.

Of the species which he enumerates, *A. picta*, *A. cornea*, *A. felina*, *A. inflata*, and *A. phasianella*, Angas (since described), have whorls smooth and not plicate or varicose, and the labium exhibiting, in *A. picta* only, but the faintest approach to a truncation, the columella in the remaining species being rather straight, and generally blending into the labrum, which is slightly effuse at the base.

Thus it will be seen that the characters assigned to the genus are not quite accurately applicable to all the species which have been included therein; and therefore I would propose the following divisions, which may somewhat facilitate their identification.

Those species which have the whorls strengthened with varices (generally tumid) and the columella more or less (for this character is variable) truncated, will constitute the genus *Alaba* proper; and those devoid of the varices and wanting the columellar truncation may form the subgenus *Diala*, A. Adams, *l. c.* 1861, viii. p. 242, and 1862, x. p. 298. The subgenus *Styliferina*, A. Adams, *l. c.* p. 299, is closely associated with the preceding group; indeed there scarcely appear characters sufficient to warrant a separation. The chief peculiarity mentioned as distinguishing this form is in the apex "vertice mucronato;" but it does not differ to any material extent from that of several of the typical species.

#### ALABA.

Whorls tumidly varicose; columella more or less truncated; labrum thickened in the adult state.

*A. vibex*, A. Ad.; *A. tervaricosa*, C. B. Ad.; *A. melanura*, C. B. Ad.; *A. supralirata*, Carpenter; *A. zebrina*, A. Ad.; *A. leucosticta*, A. Ad.; *A. blanfordi*, A. Ad.; *A. puncto-striata*, Gould.

#### Subgen. DIALA.

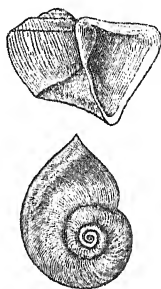
Whorls not varicose (sometimes noded around the middle; columella straightish, not truncated; labrum not thickened.

*D. lauta*, A. Ad.; *D. suturalis*, A. Ad.; *D. varia*, A. Ad.; *D. sulcifera*, A. Ad.; *D. picta*, A. Ad.; *D. pulchra*, A. Ad.; *D. imbricata*, A. Ad.; *D. monile*, A. Ad.; *D. pagodula*, A. Ad.; *D. phasianella*, Angas; *D. (Alaba) tenuis*, Smith; *D. cornea*, A. Ad.; *D. simplex*, Smith.

*Diala rufilabris*, A. Ad., differs essentially from this genus in that the peristome is continuous, very much thickened everywhere, and the aperture oblique, the columella being consequently oblique also, and not more or less perpendicular as is the case in all the species in this group. Thus it will be seen that it should be removed to the genus *Hydrobia*.

With the exception of *Alaba puncto-striata*, Gould, all the species above enumerated are represented in the British Museum, as are also those species described by P. P. Carpenter in the 'Catalogue of Mazatlan Shells.' But these, with one exception, I have purposely omitted; for the mutilated condition of the specimens is such that it is impossible to say to what genus they (when perfect) may have belonged.

And here I cannot refrain, although always averse to censuring criticism, from condemning most energetically that pernicious practice of describing fragments of minute specimens and assigning specific names to them. It merely results in burdening science with a mass of literature almost useless; for it is simply an impossibility for any one to identify their specimens from the description of those miserable fragments characterized in the Mazatlan Catalogue. Describe them and welcome, for no harm is thereby done, albeit but little good; but for the sake of others let us not name them.



*Diala leithii*.

*DIALA LEITHII*, sp. nov.

*Testa imperforata, ovato-fusiformis; spira acuminata, tenuis, parum nitida, sordide flavida, fasciis spiralibus angustis rufis parum conspicuis ornata, una circa medium anfr. superiorum, duabus in ultimo, altera paululum supra, altera paululum medium infra; anfractus 9, convexi, medio levissime angulati, spirahiter æquidistanter striati, striis in anfr. superioribus circiter 8, in ultimo ad 18; sutura parum obliqua, profundiuscula; apertura ovata, ad basin acuminate effusa, longitudinis totius ad  $\frac{5}{13}$ ; æquans, fasciis externis bifasciata; columella arcuata leviterque incrassata; labrum tenue, simplex.*

*Operculum corneum, tenue, paucispirale, nucleo subcentrali.*

Long.  $7\frac{1}{2}$  mill. Diam. fere 3.

*Hab.* California.

The angulation of the whorls is very slight in most specimens, and in some altogether absent. The spiral reddish bands are not very observable, but are more distinctly observable within the aperture; indeed that which encircles the middle of the upper whorls is so faint as to be scarcely visible. The operculum consists of about three volutions; and its nucleus is situated at about one fourth the entire length from the inferior margin. Dr. Leith, who has kindly presented a good series of this species to the Museum, enclosed with them the following notes, which he made respecting the animal when observing it alive.

"*Lip* somewhat probosciform, not used in progression, and not usually projecting beyond the edge of the foot.

"*Tentacles* two, long, subulate or filiform, bearing the *eyes* on their outer side near the base.

"*Foot* much expanded in front and rounded, gradually attenuated posteriorly and caudated.

"*Reptation* not by alternate movements of right and left sides, but by uniform, undulating, progressive motion of the foot on the sides of the vessel in which it was captive.

"It moved also in an inverted position along the surface of the water, as *Planorbis* and *Lymnæa* do," as does also *Diala picta*.

Notwithstanding this species does not altogether agree with *Diala*, both as regards the shell and animal (that is, of *D. picta*), I deem it unadvisable *at present* to form a distinct subgenus for its reception. The differences in the shell consist in the columella being more arcuate than is usual, and the aperture more than ordinarily acuminate effuse at the base.

The animal varies from that of *D. picta* in having the tentacles of equal (and not unequal) length, the foot not auriculate, and in the four long tentacular filaments attached to the operculigerous lobe being wanting. These peculiarities in the animals certainly appear to be sufficient to dissociate them; but until more complete and accurate investigations have been made on these and other species of this genus, I shall refrain from adding to the already superfluous number of genera one so ill defined.

#### 4. Notes on the Figures of *Herpestes ferrugineus* and *Ovis polii*. By W. T. BLANFORD, F.Z.S.

[Received July 5, 1875.]

In the plate of *Herpestes ferrugineus* published in the 'Proceedings' for 1874 (plate lxxxi.) there is a slight error, to which, however, it is as well to call attention. The animal is represented on a tree. Now all the Indian and African species of Mongoose with which I am acquainted (*H. griseus*, *H. malaccensis*, *H. persicus*, and others) are thoroughly terrestrial in their habits, and rarely, if ever, climb trees. The plate was, of course, drawn after I left England, and is, I think, a good representation of the animal.

There are, however, some very serious errors in the figure of *Ovis polii*\* (pl. liii.). I have examined a series of skins brought from Kashgar; and I find that none possesses a trace of the mane along the neck, represented in both sexes in the plate; there is some long hair behind the horns, and a little between the shoulders, but none on the back of the neck. In the plate, too, the male standing up has a long bushy tail, and the female lying down has a black line down the back. Both these peculiarities, I regret to say, are due to the artist: the animal has really a very short tail, so short that in life it can

\* I think this, and not *O. poli*, is the correct mode of spelling this animal's name.



scarcely be seen in general; and there is no trace of a dark line down the back. The general colour of the animals, as figured, is too rufous; the lower parts are not sufficiently white; and the horns in the male are poorly drawn.

It is only due to Dr. Stoliczka to point out that the drawing from which the plate was taken was not sent by him, and that he is only responsible for the description, p. 425, in which it will be seen that no mane or dorsal stripe is mentioned, and that the length of the tail is given as only 4 inches. The drawing was by Col. Gordon, who of course is not a naturalist; but I can hardly suppose that the mistakes mentioned were made by any one having the animal before him. In any case it is essential to point out these errors before somebody invents a new genus for this long-tailed and maned type of the genus *Ovis*.

5. Description of two new Species of Birds from the State of Antioquia, U. S. C. By P. L. SCLATER, M.A., F.R.S., and OSBERT SALVIN, M.A., F.R.S.

[Received July 9, 1875.]

Mr. T. K. Salmon, who has now returned to his former quarters at Medellin, the capital of the the Columbian State of Antioquia, has sent us a new collection of birds, formed in the neighbourhood of that city. Amongst these are single examples of two species which appear to be new to science\*, and which we propose to describe as follows:—

*CATHARUS PHÆOPLEURUS*, sp. nov.,

*Supra olivaceo-brunneus: dorso, collo postico et capite toto, nisi in gula, fusco-griseis: subtus in gula et abdomine medio albus, illa plumbeo variegata: pectore et hypochondriis griseo-plumbeis: rostro et pedibus flavis: long. tota alæ 6·3, caudæ 2·3, rostri a rictu, 0·85 poll. Angl.*

*Hab.* in Statu Antioquiensi reipublicæ Columbianæ.

*Obs.* A *C. mexicano* capite griseo et pectore hypochondriisque magis plumbeis, a *C. fuscato* dorso olivaceo-brunneo et capitis colore, necnon a *C. griseicapite* dorso obscuriore et coloribus corporis inferioris diversus.

*Mus.* P. L. S.

This species of *Catharus*, of which Mr. Salmon sends but a single specimen, resembles several distinct species of the genus, being somewhat intermediate in its characters between the black-headed group represented by *C. mexicanus* and *C. fuscater*, and the grey-headed *C. griseiceps*, which belongs more properly to the group represented by *C. melpomene*.

The discovery of *C. phæopleurus* raises the number of species of this genus now known (*i. e.* if we allow *C. maculatus* to be di-

\* The species described as new from Mr. Salmon's former collection from this district were *Chlorochrysa nitidissima*, Sel. P. Z. S. 1873, p. 728, *Grallaria ruficeps*, Sel. P. Z. S. 1873, p. 729, and *Tigrisoma salmoni*, Sel. et Salv. P. Z. S. 1875, p. 38.

stinct from *C. dryas*, a question open to doubt) to eleven, all of which are found either in the north-western districts of S. America or in Central America.

*AUTOMOLUS HOLOSTICTUS*, sp. nov.

*Supra niger, usque ad medium dorsum flammulis longis pallide cervinis ornatus: alis et dorso inferiore brunneis, scapularium scapis cervinis: uropygio et cauda tota rubiginoso-rufis: subtus cervinus, in ventre magis brunnescens; plumarum marginibus fuscis, et harum scapis clare cervinis: rostro saturate corneo, pedibus fuscis: long. tota 8.5, alæ 3.3, caudæ rectr. med. 3.7, ext. 2.4, tarsi 1.1.*

*Hab.* in Statu Antioquiensi reipubl. Columbianæ.

*Mus.* P. L. S.

This fine large species at first sight resembles in plumage *Thripadectes flammulatus*, but has not the peculiarly formed bill of that species, and belongs to the træ *Automoli*, being nearest perhaps to the newly described *A. striaticeps* (P. Z. S. 1875, p. 37).

6. Report on the Indian Elephant which died in the Gardens on July 7th, 1875. By A. H. GARROD, M.A., Prosector to the Society.

[Received July 15, 1875.]

On May 1st, 1851, the Society purchased of Mr. Batty (then of the Circus, Westminster Bridge), for £800, an adult female *Elephas indicus* with its female calf. The specimens had been deposited in the Society's Gardens on the 19th of the preceding month. In the spring of the year 1850, John Stimpson, now keeper in the Society's service, left the E.I. Company's military service, and when at Cawnpore, on his way to Calcutta, met an animal-dealer, Mr. Wallace, who was on his way to Calcutta with the female and calf in question as well as another Elephant. Stimpson is sure that the calf was born after the female had been captured, and thinks that it was three months old when he first saw it. He assisted in taking charge of the animals till they arrived in this country: they were five months on the voyage.

Of the two specimens purchased by the Society the mother was sold on April 28th, 1854, to the Zoological Society of Brussels, the calf continuing to suckle until that date, *i. e.* until upwards of four years of age.

It is this calf of 1851 which died on July 7th, 1875 (25 years old). The Superintendent, the head keeper, and the Elephant-keepers are of opinion that it continued to grow until within a year of its death. Its height at the withers at the time of its death was just eight feet.

For the last four years at least the animal has lost the power of extending its trunk, from paralysis of the anterior intrinsic muscles of of that organ. It has thus not been able to throw its trunk over its

head, or even the least forwards. When it took food it flexed the trunk so as to present the orifice forwards. This symptom is one of decay.

For the last two years of its life it exhibited marked signs of rheumatism, varying in severity, very considerable at times. This was most manifest on its kneeling down to be saddled.

The animal during the last three years of its life looked preternaturally aged, and worn out. It has never suffered the least from cough, and has not become strikingly thin. It carried its saddle and visitors 36 hours before its death, apparently without discomfort, and ate well on the evening of the 6th inst.

For about six months the animal did not, as it was formerly wont to do, lie down at night. On the night of the 6th of July it fell on its left side, and did not subsequently make any powerful attempt to rise. The breathing was, when down, unusually rapid (about 25 a minute); and no marked symptoms of pain manifested themselves, general discomfort being evident. It died during the night of the 7th, having at 8:30 P.M. had a large dose (over 100 grs.) of strychnia given it by the mouth. Whether the poison was the cause of death is uncertain.

With the exception of one of the lungs, all the organs, the brain included, were perfectly healthy. The lung in question was almost entirely infiltrated with tubercular deposit, not more than one sixth being competent for the respiratory function. The tubercular infiltration was uniform or nearly so, being of a lighter colour and nearly in a condition to break up in the centre of the organ, forming a dark grey solid mass in the more recently affected portions near the margins.

It may be mentioned that the teeth just coming into wear had, in both jaws, 23, 24, or 25 plates; they were therefore the sixth molars. The epiphyses of the long bones were firmly united.

No entozoa were found.

As to the duration of the disease it is not easy to decide. It, no doubt, was of considerable standing; probably it had commenced with the first signs of decrepitude, about three years ago.

As to the cause of the tuberculosis, that was probably connected with the animal having been born and bred in captivity in a cold climate. A wild-caught animal 4 or 5 years of age would probably have thriven better.

## 7. On the Habits of the Fishes of the Genus *Antennarius*.

By the Rev. S. J. WHITMEE, of Samoa, C.M.Z.S.

[Received August 24, 1875.]

A few days ago a native brought me a living *Antennarius* which I at first thought was an undescribed species. Dr. Günther says of this genus, "there is scarcely another genus of fishes which offers so much difficulty in the discrimination of the species"\*. He has

\* Cat. of Fishes in British Museum, vol. iii. p. 184.

kindly determined the present individual, which I have sent to the British Museum, as *A. coccineus* (Less.).

The fish is found sticking to corals and stones on the reefs of Upolu, and is very difficult to distinguish from the coral or stone. Its Samoan name is *La'otali*.

As this fish was brought to me alive, I kept it in an aquarium in my study for a few days to observe its habits. It was brought in a cocoa-nut shell with very little water; and its stomach was greatly distended with air. When put into the aquarium it was some minutes before it could sink. It struggled hard to get down, and as the air was discharged it went down, and immediately attached itself, in a vertical position, to a block of coral by means of its pectoral and ventral fins. These were distended, and looked very much as if they served the purpose of sucking-disks (like the united ventrals in some of the *Gobiidae*) as well as answering in place of *feet*. When attached it held on very firmly, and I had a difficulty in disengaging it. Natives have told me that they have taken up a block of coral with this fish attached, and have had great difficulty in shaking it off.

After being in the water a few minutes my fish moved from its first position and, apparently, sought one better adapted to its habits. It cut a poor figure when attempting to swim, and prepared to *walk* where it could. It again fixed itself, in a vertical position with the head up, in an indentation in a coral block which pretty well matched its size. When attached it looked much like the block itself, the cutaneous tentacles and ocellated spots greatly resembling the fine seaweed and coloured nullipores with which the dead portions of corals and stones are more or less coated in these seas. As I watched it I could not help thinking that this fish presents us with what we now call (since Mr. Bates introduced the term) "mimicry." Being a slow swimmer and carnivorous, it has to get its food by stratagem. Hence the advantage of those characteristics which make it so grotesque in appearance—wide vertical mouth, rough and spotted skin with cutaneous tentacles, and the anterior dorsal spine modified into a soft tentacle.

I had positive evidence that the example in question was carnivorous. A short time after it had been put into the aquarium it vomited a slightly decomposed fish 1 inch 5 lines in length. This was one of the small fishes always seen in great abundance about the coral patches, nibbling at the fine seaweeds and the growing points of the corals. The capture of such fishes when unconsciously approaching it would, I believe, be greatly facilitated by the strong current produced when this *Antennarius* sucks the water into its capacious jaws. From its vertical position when fixed on a stone, the jaws open horizontally; and they are very wide. When examining the fish I placed it in a basin with about a pint of water. So much water was drawn into its jaws and expelled with such force through the foramina, which are directed backwards behind the pectorals, that a rapid rotatory motion was produced in all the water. This, I imagine, would be sufficient to engulf many a small fish or crustacean within its stomach.

The natives frequently get "stung" by the third dorsal spine of this fish, when they happen to pick up a block to which it is attached, before they are aware of its presence. It causes very great agony, which usually lasts several hours, and sometimes two or three days. Another fish, which I believe is also an *Antennarius*, but which I have not yet examined, produces effects much more alarming than this one. I have seen the hands and feet of natives swollen and greatly inflamed by a prick from the larger species, and have seen strong men weeping and groaning like children with the agony it caused. Sometimes the effect produced by a prick from this lasts for weeks.

Two or three weeks after procuring the fish described above, another living *Antennarius* was brought to me by one of my collectors. This, which has been likewise sent to the British Museum, is, as I am told by Dr. Günther, *A. multiocellatus* (Cuv. et Val.).

I had this example alive in my aquarium for several days. It was brought to me out of the water, and had been out several minutes. It seemed somewhat exhausted, but soon recovered when placed in the water. It affected a singular position. It moved occasionally from one place to another, and evidently preferred a position between two coral blocks near together. Here it planted its ventrals firmly on the sand at the bottom of the aquarium, while it fixed its pectorals, in the manner of disks, on the sides of the blocks of coral between which it was stationed, and raised its posterior extremity at an angle not far from the vertical. In this position it reminded me of the antics of "city Arabs" who walk on their hands with their legs in the air; its posture was almost exactly that assumed in such an exercise. The caudal fin was bent over towards the dorsal and in a line with it, while the anal was brought almost into line with the major axis of the body, occupying the position belonging to the caudal. Whenever it fixed itself for any length of time, it was always in this position; and in that attitude it *angled* with the ciliated anterior dorsal for some of the small fish in the aquarium. I hoped to see it catch one; but they were too wary. There were seven fish not too large for the *Antennarii*; but they had been some months in captivity, were quite at home in every nook and corner, and knew too well the nature of the new inmate to allow themselves to be taken off their guard. I am accustomed to feed these with bread-crumbs, and I tried to entice them to the neighbourhood of the *Antennarius* by dropping some so as to fall immediately in front of it. But it was to no purpose; they kept at a safe distance. When one ventured to dash at a falling crumb rather nearer than usual, it immediately darted away again in evident fear.

The way in which these little creatures showed their anger at the intruder amused me. They never approached it from the front, but always behind, and invariably *backwards*. As the *Antennarius* was protected behind by the coral blocks they had to approach it through the interstices of the coral; and only small fish could do this. When sufficiently near to suppose they could annoy their enemy, by a rapid motion of the caudal fin they lashed the water and then

darted away. But I never saw one actually strike the *Antennarius*.

This mode of attack, no doubt, explains why this fish chooses such a position as that observed by my example. Being very slow in its movements, it protects its posterior parts. Did it not do this it might be seriously injured by an *Acanthurus*. I have frequently observed my fishes fight by approaching backwards and lashing at each other with the tail. This will doubtless furnish a good reason for the formidable lateral armature of the tail in the *Acronuridae* and some other families of fishes.

#### 8. A Monograph of the Genus *Taphozous*, Geoff.

By G. E. DOBSON, M.A., M.B., F.L.S., &c.

[Received September 1, 1875.]

In 1872 I published some notes on the Asiatic species of *Taphozous*, giving a short synopsis of the species, in which they were divided into two groups. Since that time I have examined the types and large collections of specimens of the species of this genus in the British Museum, in the Museum of the East-India Company, in the Leyden, Berlin, and Paris Museums, also the collection in the Liverpool Museum and that of Sir Walter Elliot (most kindly forwarded from Scotland for my examination), as well as some private collections. Adding to these the large collection in the Indian Museum, Calcutta, I have thus examined a great number of specimens of the species of this genus, including the types, and am enabled to remove some nominal species from the list, to describe in detail, and to exhibit, in tabular form, according to their natural affinities, all the species of *Taphozous*.

#### TAPHOZOUS.

*Taphozous*, Geoffroy, Descript. de l'Égypte, ii. p. 126; Temminck, Monogr. Mammal. ii. p. 277 (excl. *Taphozous lepturus*, Geoff. et Temm.); Wagner, Suppl. Schreb. Säugeth. v. p. 684.

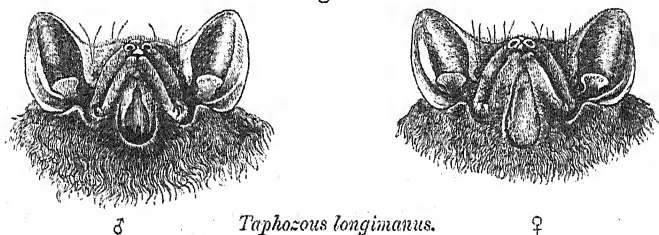
Muzzle very conical, broad behind, very narrow in front, terminated by the slightly projecting inner margins of the valvular nostrils. Crown of the head very slightly raised above the face-line: a deep frontal excavation between the eyes; ears separate, the inner margin of the conch arising by a short band from the side of the frontal concavity, the outer margin of the conch commencing in a small lobe close to the angle of the mouth but on a lower level; tragus short, narrowest opposite the base of its inner margin, expanded above; lower lip as long or slightly longer than the upper lip, terminating in front in two small triangular naked spaces separated by a more or less deep groove; eyes rather large, a distinct horizontal groove on the face beneath; thumb with a small but very acute claw; first phalanx of middle finger folded (in repose) on dorsum of metacarpal bone; foot long and slender, the outer toe as long as the middle toe, the inner

toe shortest; tail perforating the interfemoral membrane and appearing on its upper surface, capable of being partially withdrawn.

*Dentition*.—Inc.  $\frac{1-1}{4}$ ; C.  $\frac{1-1}{1-1}$ ; Pm.  $\frac{2-2}{2-2}$ ; M.  $\frac{3-3}{3-3}$ .

Premaxillaries cartilaginous, supporting a pair of small weak incisors often absent in adult animals; canines rather close together, much curved forwards, separated from the second premolar by a wide space in which the first minute premolar scarcely appears above the level of the gum; second upper premolar exceeding the molar in vertical extent; last molar consisting of a narrow transverse bony lamina; mesopterygoid fossa very narrow, the pterygoid plates terminating in long hamular processes; immediately behind, the basi-sphenoid is deeply excavated on either side of a narrow longitudinal bony ridge which connects the roof of the mesopterygoid fossa with the basioccipital, the excavations forming corresponding elevations on the floor of the brain-case; postorbital processes very long, connected by ligament with the zygoma, and thus completely circumscribing the orbit.

Fig. 1.



*Taphozous longimanus.*

Most of the species of this genus have a peculiar glandular sac (see fig. 1) placed between the angles of the lower jaw—a sexual character; for, while always more developed in males than in females, in some species while distinct in the male it is quite absent in the female. The width of the opening of the sac is nearly equal to half the distance between the angles of the jaw; and the direction of the opening is anterior. This open *gular sac* is quite absent in both sexes in *T. melanopogon*, but about its usual position the openings of small pores may be seen, the secretion exuding from which probably causes the hairs in this situation to grow very long, forming the black beard found in many male specimens of this species.

In the greater number of species, also, a small band of integument passes from the inferior surface of the forearm near its distal extremity to the proximal extremity of the fifth metacarpal bone, forming a small pouch with the wing-membrane—the *radio-metacarpal pouch*.

This genus is limited to the tropical and subtropical regions of the Eastern Hemisphere, in which it is widely distributed. The distribution of the species is shown as follows:—

Africa and its islands . . . . .	3
North-eastern Africa and South-western Asia . .	1
Asia and Malayana . . . . .	5
Australia and New Guinea . . . . .	1

Synopsis of Subgenera and Species.

- I. Radio-metacarpal pouch distinct; lower lip scarcely grooved ..... Subgenus *Taphozous*.
- a*. Radio-metacarpal pouch well developed.
- a'*. No gular sac in male or female.
- a''*. Fur of the back extending upon part of the wing- and interfemoral membranes; extremity of tail thickened ..... 1. *T. melanopogon*, Temm.
- b''*. Fur of the back very narrow across loins, not extending upon the membranes; extremity of tail not thickened ..... 2. *T. theobaldi*, Dobson.
- b'*. Gular sac present in males, rudimentary or absent in females.
- c''*. Gular sac quite absent in females, throat hairy beneath.
- a'''*. Ears as long or longer than the head... 3. *T. australis*, Gould.
- b'''*. Ears shorter than the head ..... 4. *T. perforatus*, Geoff.
- d''*. Gular sac rudimentary in females, throat naked beneath.
- c'''*. Fur brown above and beneath ..... 5. *T. longimanus*, Hardw.
- d'''*. Fur brown above, and beneath neck; chest and abdomen pure white..... 6. *T. mauritanus*, Geoff.
- b*. Radio-metacarpal pouch small; fur very short, not extending to membranes ..... 7. *T. nudiventris*, Rüpp.
- II. No radio-metacarpal pouch; lower lip divided in the centre of its upper surface, and in front by a deep narrow groove ..... Subgenus *Taphonycteris*.
- a*. Ears broadly rounded off above; inner margin smooth, slightly convex above; forearm three inches or less.
- a'*. Gular sac developed (but smaller) in female also; fur dark brown above and beneath... 8. *T. saccolemus*, Temm.
- b'*. Gular sac rudimentary in female, the margins alone developed; fur brown above, pure white beneath ..... 9. *T. affinis*, Dobson.
- b*. Ears triangular, narrowly rounded off above; inner margin papillate; forearm three and a half inches at least..... 10. *T. peli*, Temm.

I. *Radio-metacarpal pouch distinct; lower lip scarcely grooved.*

Subgenus 1. TAPHOZOUS.

1. TAPHOZOUS MELANOPOGON.

*Taphozous melanopogon*, Temm. Monog. Mammal. ii. p. 287; Wagner, Suppl. Schreb. Säugeth. v. p. 687; Cantor, Journ. Asiat. Soc. Beng. xv. p. 180; Dobson, Proc. Asiat. Soc. Beng. Aug. 1872, p. 153.

*Taphozous philippinensis*, Waterhouse, P. Z. S. 1845, p. 9.

No gular pouch; the openings of small pores appearing beneath the fur covering the inferior surface of the lower jaw between its angles; in some male specimens the hair in this situation is very long, forming a dense black beard. Radio-metacarpal pouch large.

Wings from the tibiae above the ankles.

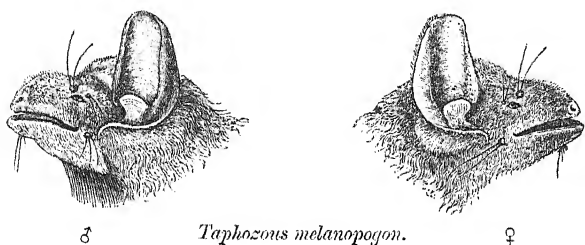
The fur of the head extends upon the face as far as a line joining the inner corners of the eyes; the inner side of the ear-conch is



covered with a few hairs; posteriorly the ears are clothed at their bases, naked above except where a row of fine hairs fringe the outer margin.

On the upper surface the fur of the body extends upon the wing-membrane about one third the length of the humerus and femur,

Fig. 2.

*Taphezous melanopogon.*

the remainder of the wing- and antebrachial membranes are quite naked; posteriorly the interfemoral is covered thinly almost as far as the point where the tail perforates it; inferiorly, the fur of the body extends outwards upon the wing-membrane as far as a line joining the middle of the humerus and femur; beyond this, as in other species, a band of very short fine hair extends along the posterior margin of the forearm to the carpus; the feet are naked, except where a few hairs arise at the base of the claws on the backs of the terminal phalanges of the toes.

Above, the fur is white at the base, then dark-brown, the extreme tips slightly grayish; beneath, white at the base, then paler brown than on the upper surface, the extreme tips grayish. In some specimens the white at the base of the hairs beneath is not well marked.

The black beard is not always developed in the males; its development seems to depend on certain conditions as yet not known; probably it appears periodically during the rutting-season. In five male specimens in the Indian Museum this beard is well developed, while out of over one hundred specimens received by M. Milne-Edwards from Cochin China, examined by me in the Paris Museum, two only possessed the beard.

The females of this species (in which neither the black beard nor pore-openings are developed) resemble those of *T. longimanus*; they are readily distinguished, however, by the absence of the rudimentary gular sac, and by the under surface of the lower jaw being well clothed with hair, by the larger ears, and especially by the tail, which is thickened and somewhat laterally compressed towards the tip, though in every other species of the genus it tapers slightly towards its extremity.

Length: head and body 3''·1; tail 1''·0; ear 0''·85, tragus 0''·23; forearm 2''·5; thumb 0''·35; second finger—metacarp. 2''·2, 1st ph.

0''·8, 2nd ph. 0''·9; fourth finger 2''·1; tibia 0''·9; foot and claws 0''·5.

*Hab.* Bengal (Jashpur), Pinang, Burma, Cochin China, Java.

Type in the collection of the Leyden Museum.

## 2. TAPHOZOUS THEOBALDI.

*Taphozous theobaldi*, Dobson, Proc. Asiat. Soc. Beng. Aug. 1872, p. 152.

Gular sac absent in both sexes. Inner margin of the ear papillate; ears larger than in any of the species of *Taphozous*. Radio-metacarpal pouch well developed, larger than in *T. melanopogon*. Wings from the tibiæ above the ankles.

The fur of the head extends upon the face as far as a line drawn between the inner corners of the eyes, the remainder of the muzzle is nearly naked; ear-conch naked, except where a few hairs clothe the basal portion of its inner surface; posteriorly the ears are naked except at the base and along their outer margins.

On the upper surface the wing- and interfemoral membranes are quite naked, the fur being strictly limited to the body; laterally the limit of the fur upon the back is defined by a well-marked line, convex *inwards* in the lumbar region; in *T. saccolæmus* and in *T. nudiventris* the line of fur is convex *outwards* in the same situation; so that in this species the space occupied by fur in the lumbar region is narrower than in any of the other species, and appears to depend on the position of attachment of the wing-membrane. The tail has but three or four long, very fine hairs.

Inferiorly, the chin is naked as far as the anterior prolongation of the external margin of the ears; the fur of the body extends upon the wing-membrane as far as a line joining the middle of the humerus and femur; from this a band of fine hairs extends outwards to the carpus; the interfemoral membrane is naked; the backs of the toes are covered with very short hairs.

Upper incisors very short and blunt.

Length: head and body 3''·35; tail 1''·35; head 1''·15; ear (anteriorly) 1''·1, tragus 0''·28; forearm 3''·0; thumb 0''·45; second finger 4''·7; fourth finger 2''·5; tibia 1''·15; calcaneum 0''·9; foot and claws 0''·65.

*Hab.* Tenasserim Province.

Type in the collection of the Indian Museum, Calcutta.

## 3. TAPHOZOUS AUSTRALIS.

*Taphozous australis*, Gould, Mammals of Australia; Wagner, Suppl. Schreb. Säugeth. v. p. 690.

A distinct but rather small throat-sac in males, in females quite absent, the chin being covered with hairs in the position occupied by the throat-sac in the males. Ears large, as long as the head, inner margin of the ear-conch papillate; no lobule at the base of the tragus. Radio-metacarpal pouch well developed.

Wings from the ankles or tarsus. Tail slender.

The face is everywhere covered with hair, which in front of the frontal depression is very short. The fur of the back extends for a short distance upon the wing-membrane, and upon the interfemoral as far as the point perforated by the tail; the remaining part has a few short hairs. Beneath, the wing-membrane is densely covered as far as a line drawn from the middle of the humerus to the knee, the limit of the fur being strictly defined as in *T. melanopogon*. As in other species, a band of fur passes outwards behind the forearm to the carpus.

Fur, above and beneath, white at the base, the remaining three fourths of the hairs above dark-brown, and terminal half beneath paler brown. The fur of the body rather long and dense.

Length: head and body 3".0; tail 1".3; ear 0".95, tragus 0".28; forearm 2".7; thumb 0".4; second finger—metacarp. 2".5, 1st ph. 8", 2nd ph. 1".1; fourth finger 2".45; tibia 1".05; calcaneum 0".8; foot and claws 0".45.

*Hab.* Australia, New Guinea.

Type in the collection of the British Museum.

### 3 a. TAPHOZOUS AUSTRALIS, var. FLAVIVENTRIS.

*Taphozous flaviventris* (Gould), Peters, P. Z. S. 1866, p. 430.

This appears to be a variety only of *T. australis*, differing in its greater size. Prof. Peters remarks:—"This species, represented by a single male submitted to my examination by Mr. Gould, is, although nearly related to *T. australis*, Gould, different in colour and in its superior size."

### 4. TAPHOZOUS PERFORATUS.

*Taphozous perforatus*, Geoffroy, Descript. de l'Egypte, ii. p. 126; Temm. Monog. Mamm. ii. p. 281; Wagner, Suppl. Schreb. Säugeth. v. p. 684.

Gular sac in males large, in females quite absent, chin hairy beneath; ears shorter than the head, inner margin faintly papillate. Radio-metacarpal pouch well developed.

Wings from the tibiæ, about a quarter of an inch above the ankles. Extremity of tail attenuated.

Fur short, dark-brown above and beneath, extending on both surfaces of the wing-membrane from the middle of the humerus to the middle of the femur, on the interfemoral membrane as far as the point perforated by the tail.

Length: head and body 2".95; tail 0".95; ear 0".7, tragus 0".23; forearm 2".4; thumb 0".35; second finger—metacarp. 2".2, 1st ph. 0".7, 2nd ph. 0".9; fourth finger 2".0; tibia 0".9; foot and claws 0".45.

*Hab.* Egypt.

Type in the collection of the Paris Museum.

### 5. TAPHOZOUS LONGIMANUS.

*Taphozous longimanus*, Hardwicke, Linn. Trans. xiv. p. 525;

Temm. Monog. Mammal. ii. p. 289; Blyth, Journ. Asiat. Soc. Beng. x. p. 974; Kelaart, Prodr. Faunæ Zeylanicæ, p. 12; Wagner, Suppl. Schreb. Säugeth. v. p. 688; Horsfield, Catal. Mammal. Mus. E. I. Comp. p. 41; Dobson, Proc. Asiat. Soc. Beng. Aug. 1872, p. 153.

*Taphozous bicolor*, Temm. l. c. p. 290.

*Taphozous fulvidus* et *brevicaudus*, Blyth, Journ. Asiat. Soc. Beng. x. p. 975.

*Taphozous cantori*, id. xi. 784.

The gular sac is large and well-developed, though not so large as in *T. saccolæmus*; in the female it is represented by a rudimentary fold of skin and nakedness of the integument in the same situation. Radio-metacarpal pouch moderately developed. Inner margin of ear smooth, not papillate; ears about same size as in *T. saccolæmus*. Wings from the ankles.

The fur of the head extends upon the face slightly in front of the eyes; the muzzle is almost quite naked; the inner side of the ear-conch is rather thickly covered with moderately long, fine hair; posteriorly the ear is almost naked, but a few fine hairs are ranged along the outer margin; the tragus is quite naked. On the upper surface the fur of the body extends upon the wing-membrane as far as a line joining the middle of the humerus and femur; posteriorly the interfemoral membrane is covered as far as the point of exit of the tail, along which some long fine hairs extend; the remainder of the interfemoral membrane is clothed with very short, almost invisible fur, which extends along the tibiæ to the feet, becoming longer on the terminal phalanges of the toes.

Beneath, the fur in front of the gular pouch, under the chin, is very short, and the skin there almost naked; the antebrachial membrane is covered with longer fur than upon the upper surface; on the wing-membrane the fur of the body extends more densely and further outwards than on the upper surface, being limited by a line joining the distal and middle thirds of the humerus and femur, but a narrow band of hairs extends outwards to the carpus; posteriorly the interfemoral membrane is naked, except at the root of the tail.

Fur varying from reddish-brown to black, above and beneath, the bases of the hairs white.

Upper incisors small and very slender in some individuals, in the greater number of specimens absent.

Length: head and body 3''·1; tail 1''·15; head 0''·95; ear (anteriorly) 0''·8, tragus 0''·25; forearm 2''·45; thumb 0''·3; second finger 4''·2; fourth finger 2''·15; tibia 0''·95; calcaneum 0''·85; foot and claws 0''·45.

*Hab.* Indian peninsula, Ceylon, Burmah.

Abundant about Calcutta and in all the southern parts of the Indian peninsula; not yet recorded from Northern India, nor from the Himalaya.

The colour of the fur varies very much. Among a large collection of specimens taken at the same place, one may be found with reddish-brown fur, the others blacker. In all cases, however, the base of the fur is white, and the darker-coloured individuals are generally females.

This species very closely resembles *T. perforatus*, Geoff., and may yet be shown to be a variety only of that species. The number of specimens of both species in the Museums at present is not sufficient to decide the question.

Type in the collection of the British Museum.

#### 6. TAPHOZOUS MAURITIANUS.

*Taphozous mauritianus*, Geoffroy, Descript. de l'Egypte, ii. p. 127 ; Temm. Monogr. Mammal. ii. p. 291 ; Wagner, Suppl. Schreb. Säugeth. v. p. 685.

*Taphozous leucopterus*, Temm. l. c. p. 284.

Inner margin of the ear indistinctly papillate ; tragus naked, with a distinct angular projection near the base of its outer margin. Gular sac distinct in males, rudimentary in females, the throat being naked only in the position of the sac. Radio-metacarpal pouch smaller than in *T. longimanus*. Wings from the ankles. Feet small.

On the upper surface the face in front of the eyes is covered with short hairs, and the fur of the back extends upon the interfemoral membrane slightly beyond the point of perforation by the tail ; beneath, the distribution of fur upon the membrane is similar, but the interfemoral is very thinly covered.

Fur, above, from the base for three fourths its length light buffy-brown, then dark brown with grey extremities ; beneath, similar on shoulders and sides of the thorax and neck behind the ears as far back as the origin of the antehumeral membrane, the neck behind the gular pouch and the remainder of the chest and abdomen pure white.

On the upper surface the wing-membrane as far outwards as a line drawn from the ankle to the elbow, and also the antehumeral and interfemoral membranes are brown, the remaining part of the wing-membrane white, except a small ill-defined patch of brown inside the first phalange of the longest finger ; beneath, all the membranes are white.

Length (of an adult male) : head and body 3''·1 ; tail 1''·0 ; ear (anteriorly) 0''·8, tragus 0''·25 ; forearm 2''·4 ; thumb 0''·3 ; second finger 4''·0 ; fourth finger 2''·2 ; tibia 0''·85 ; foot and claws 0''·45.

*Hab.* Africa (eastern and western coasts), Madagascar, Bourbon and Mauritius Islands. In Africa probably limited to the tropical and subtropical regions.

Type in the collection of the Paris Museum.

#### 7. TAPHOZOUS NUDIVENTRIS.

*Taphozous nudiventris*, Cretzschmar, in Rüpp. Atlas Reise nördl. Afrika, Säugeth. p. 70, fig. 276 (1826) ; Temminck, Monogr. Mammal. ii. p. 280 ; Wagner, Suppl. Schreb. Säugeth. v. p. 684.

Inner margin of ears papillate in upper third ; muzzle naked, very pointed ; a small but distinct throat-sac in the male, in the female rudimentary, represented by a slight fold of skin and nakedness of the integument. Radio-metacarpal pouch very small. Wings

from the tibiae. Backs of toes with long hairs almost as long as in the species of *Molossi*. Fur covering the body very short, white at the base, the extremities dark-brown.

In front the fur of the head does not extend beyond the frontal depression, and the muzzle is nearly naked; the ear-conch has a few fine hairs on its inner side only, tragus naked. The fur of the back is limited laterally and posteriorly by a well-defined line beyond which the finest hair does not pass; it does not extend upon the wing or interfemoral membranes, and the humerus, forearm, and antebrachial membranes are quite naked; posteriorly the terminal line of hair is separated from the point of exit of the tail by a considerable distance; beneath, the throat is nearly naked; the wing-membrane is covered as far as a line drawn from the middle of the humerus towards the pubis, and a band of fine hairs extends outwards posterior to the forearm to the carpus; the lower part of the abdomen, the legs, and the interfemoral membrane are quite naked.

In this species large collections of fat surrounding the root of the tail and extending between the thighs are found in many specimens, especially in those taken during the hibernating season. This appears to be a provision for sustaining life during the cold season, and would seem to indicate that this is the most northerly species of the genus; for I have not observed similar deposits of fat in the body of any of the other species, which all inhabit tropical or subtropical regions. Similarly large deposits of fat are found in *Rhinopoma* alone, which inhabits the same countries with this Bat.

Length (of an adult ♀): head and body 3''·7; tail 1''·6; ear 0''·85, tragus 0''·25; forearm 2''·95; thumb 0''·45; second finger—metacarp. 2''·55, 1st ph. 1''·1, 2nd ph. 1''·2; fourth finger 2''·8; tibia 1''·2; foot and claws 0''·6.

*Hab.* North-Eastern Africa (Egypt, Nubia); Asia Minor (Palestine).

Type in the collection of the Frankfort Museum.

#### 7a. *TAPHOZOUS NUDIVENTRIS*, subsp. *KACHHENSIS*.

*Taphozous kachhensis*, Dobson, Journ. Asist. Soc. Beng. 1872, p. 221.

Very similar to *T. nudiventris* in general form and in the distribution of the fur, but distinguished by the absence of the gular sac in both male and female; in the male the usual position of the sac is indicated by a small semicircular fold of skin and nakedness of the integument; in the female the surface is smooth. The measurements are also slightly different; but the general resemblance to *T. nudiventris* is so close that I hesitate to class it as a distinct species.

Length (of an adult ♀): head and body 3''·6; tail 1''·25; ear 0''·9, tragus 0''·25; forearm 2''·95; thumb 0''·45; second finger—metacarp. 2''·7, 1st ph. 1''·1, 2nd ph. 1''·3; fourth finger 2''·7; tibia 1''·1; foot and claws 0''·65.

*Hab.* Kachh, N. W. India.

Type in the collection of the Indian Museum, Calcutta.

- II. *No radio-metacarpal pouch; lower lip divided in the centre of its upper surface, and in front by a deep narrow groove.*

Subgenus 2. TAPHONYCTERIS.

8. TAPHOZOUS SACCOLÆMUS.

*Taphozous saccolaimus*, Temminck, Monogr. Mammal. ii. p. 285. pl. 60.

*Taphozous crassus*, Blyth, Journ. As. Soc. Beng. xiii. p. 491.

*Taphozous pulcher*, Elliot, l.c. p. 492.

Ears shorter than the head; tragus concave on outer surface, upper margin regularly convex, margined posteriorly by a fringe of fine hairs; inner margin of the ear-conch smooth, not papillate; gular sac well developed in both male and female, but much larger in the male; lower lip with a deep narrow groove in the centre of its upper surface and in front. No radio-metacarpal pouch. Wings from the ankles.

On the upper surface the fur of the body scarcely extends upon the wing-membrane, the line of attachment of which seems to limit its extent; posteriorly the fur terminates, as on the sides, in a well-defined line limited by the root of the tail; the interfemoral membrane and the legs are quite naked, the feet are also naked, thus differing from the greater number of, if not from all, the species of the genus. Beneath, the chin and sides of the gular sac are covered with very short hair, the thorax and abdomen with moderately long fur, as on the upper surface; the antibrachial membrane has a few fine hairs; and the wing-membrane is covered as far as a line joining the middle of the humerus and the femur, a line of fur passing outwards to the carpus and occupying a considerable triangular patch of membrane there between the forearm and fifth metacarpal bone.

Fur, above, white at the base, the greater part of the hairs dark-brown, the surface mottled with small irregular white patches; beneath, reddish brown.

Length: head and body 3".5; tail 1".3; ear 0".8, tragus 0".23; thumb 0".5; second finger—metacarp. 2".75, 1st ph. 1".15, 2nd ph. 1".2; fourth finger 2".65; tibia 1".2; foot and claws 0".65.

*Hab.* Lower Bengal (Sylhet); Burma; Malay peninsula; Sumatra; Java.

Type in the collection of the Leyden Museum.

9. TAPHOZOUS AFFINIS.

*Taphozous affinis*, Dobson, Ann. Mag. Nat. Hist. 1875, xvi. p. 232.

Ears shorter than the head; inner margin of the ear-conch not papillate, tragus rather short, almost quite circular above, outer surface concave. Lower lip with a deep narrow groove in the centre of its upper surface. Male with a large gular sac, as large as in *T. saccolæmus*, rudimentary in the female, the margins of the sac alone developed.

No radio-metacarpal pouch. Wings from the ankles; fur, above,

black, the bases of the hairs white; beneath wholly pure silky white as in *Vesperugo temminckii*. The integument of the back is white; the antebrachial and interfemoral membranes, and that portion of the wing-membranes between the forearm and third finger, white, while that portion of the wing-membrane between the third and first fingers is black mottled with white along the third finger; beneath, the wing-membrane is pure white from the sides of the body outwards as far as the third finger, beyond which it is coloured as the corresponding part above.

This species is closely allied to *T. saccolæmus*, resembling it in its general structure and in measurements. It is at once distinguished by the pure whiteness of the fur of the thorax and abdomen, and of the wing-membrane (the same in the four specimens preserved in spirit, from which the original description was made), which in *T. saccolæmus* is always some shade of brown. Structurally it is distinguished by the complete absence of a gular sac in the females; for in *T. saccolæmus* a sac exists in the females also, though much less developed than in the males. The margins of a gular sac are well defined in this species; but no cavity exists.

Length: head and body 3''·4; tail 1''·1; ear 0''·9, tragus 0''·25; forearm 2''·9; thumb 0''·5; second finger—metacarp. 2''·8, 1st ph. 1''·2, 2nd ph. 1''·2; fourth finger 2''·5; tibia 1''·0; foot and claws 0''·6.

*Hab.* Labuan. Type in the collection of the British Museum.

#### 10. TAPHOZOUS PELI.

*Taphozous peli*, Temminck, Esq. Zool. sur la côte de Guinée, p. 82.

Ears proportionally smaller and more triangular than in the other species, upper half of the inner margin of the ear-conch papillate; tragus rather short, evenly rounded above as in *T. saccolæmus*. Lower lip with a deep narrow groove. Gular sac very large in males, rudimentary (the margins only defined) in females. No radio-metacarpal pouch.

Fur of the body short, not extending to the membranes; distribution similar to that of *T. nudiventris*.

Above, dark reddish-brown, beneath, a slightly paler shade of the same colour.

Length: head and body 4''·2; tail 1''·2; ear 1''·0, tragus 0''·3; forearm 3''·5; thumb 0''·6; second finger—metacarp. 3''·3, 1st ph. 1''·45, 2nd ph. 1''·45; fourth finger—metacarp. 2''·1, 1st ph. 0''·8, 2nd ph. 0''·45; tibia 1''·3; foot and claws 0''·8.

*Hab.* Africa, Gold Coast (Leyden Museum), Cameroon Mountains (Brit. Mus.), East Africa (Cambridge Mus.).

Type in the collection of the Leyden Museum.



9. Notes on the Fruit-pigeons of the Genus *Chrysæna*.

By OTTO FINSCH, C.M.Z.S.

[Received September 1, 1875.]

In looking over the last number of the Society's 'Proceedings' (January 1875), my attention was struck by a notice of Mr. Layard, P. Z. S. 1875, p. 30, relating to some birds of the Viti Islands, in which he says:—

"By the way, Professor von Suhm and I, after going carefully into the subject, came to the conclusion that the 'Orange Dove' of Taviani and Lanthala (*Chrysæna victor*, Gould) is a phase of plumage of the 'Green Dove' (*Chr. luteovirens*)."

I regret that Mr. Layard did not tell us more particularly by what facts he became convinced of the identity of these species, as I, being well acquainted with them, do not understand how they can be considered to be phases of one and the same species. I have examined a good series of specimens of *Chrysæna luteovirens* collected by Dr. Gräffe at Viti Levu and Ovalau, and have seen all the changes of plumage from the uniform green dress of the first year (the so-called *Pt. feliciae*, Hombr.) to the full-grown stage of the yellow plumage. This latter is, no doubt, that of the very old bird, which is likewise distinguished by a peculiarity in the structure of the feathers not to be found in any other member of the genus *Ptilonopus*. The small feathers, with exception of those of the head in *Chrysæna luteovirens*, are remarkable for their narrowed cylindrical form, reminding one in some respects of those in *Xipholena*. But this structure is not to be found in *Chrysæna victor* at all; so that if one were to take the structure of the feathers solely as a distinguishing generic character of *Chrysæna*, *C. victor* could not be placed in the genus. But, as I have shown already (P. Z. S. 1873, p. 733, foot-note), the genus *Chrysæna* differs from *Ptilonopus* chiefly in having no shortened and narrowly pointed first quill. In this character, as well as in the shortness of the wing, *C. victor* agrees very exactly with *C. luteovirens*; so that of their generic relationship there can be no doubt. But *C. victor* does not possess the peculiar feather-structure of *C. luteovirens*. Instead of the cylindrical structure of *C. luteovirens*, the feathers of *C. victor* are remarkable for the length and laxity of their rachis, which resemble those of the Parrot-genus *Coryllis* (*Loriculus*), so that the upper tail-coverts project a little over the tail-feathers. Now if *C. luteovirens* were only a phase of plumage of *C. victor*, this could be only in relation to age, and consequently *C. luteovirens* would have to be regarded as the younger bird. But the structure of its feathers shows a peculiarity which can only be attained in the fully adult bird; and there cannot be the slightest doubt that *C. luteovirens* would never lose this extraordinary character of feathers and again assume a structure of feathers which comes nearer to that of the young state. I need hardly remark that the coloration in the two species is totally different, being in *C. luteovirens*, in mature state, dark yellow, and in *C. victor* deep orange-

red, nearly the same as in *Rupicola crocea*; but I may remark that *C. victor* gets this splendid garb immediately after its first green dress, without going into an intermediate yellow dress, such as that of *C. luteovirens*. One of the specimens of *C. victor* which I have had the pleasure of examining showed the change of plumage very clearly, having on the sides of the belly and flanks still some grass-green feathers, the remnants of the first plumage. Another point of importance is also the range of both species. *C. luteovirens* has been found only on the islands of Viti-Levu and Ovalau, whereas *C. victor*, so far as our knowledge extends, is confined to the small islands of Taviuni and Lanthala, on the east coast of the large island Vanua-Levu. I believe the above-given remarks and comparisons between *C. luteovirens* and *C. victor* are sufficient to prove that they form excellent species, which ought not to be confounded in any way; at least Mr. Layard must give us far more exact and minute explanation in order to prove that his conclusions are right.

10. A Monograph of the Siliceo-fibrous Sponges. By J. S. BOWERBANK, LL.D., F.R.S., F.Z.S., &c.—Part V.

[Received September 17, 1875.]

(Plates LXI. & LXII.)

*FARREA SPINIFERA*. (Plate LXI. fig. 1.)

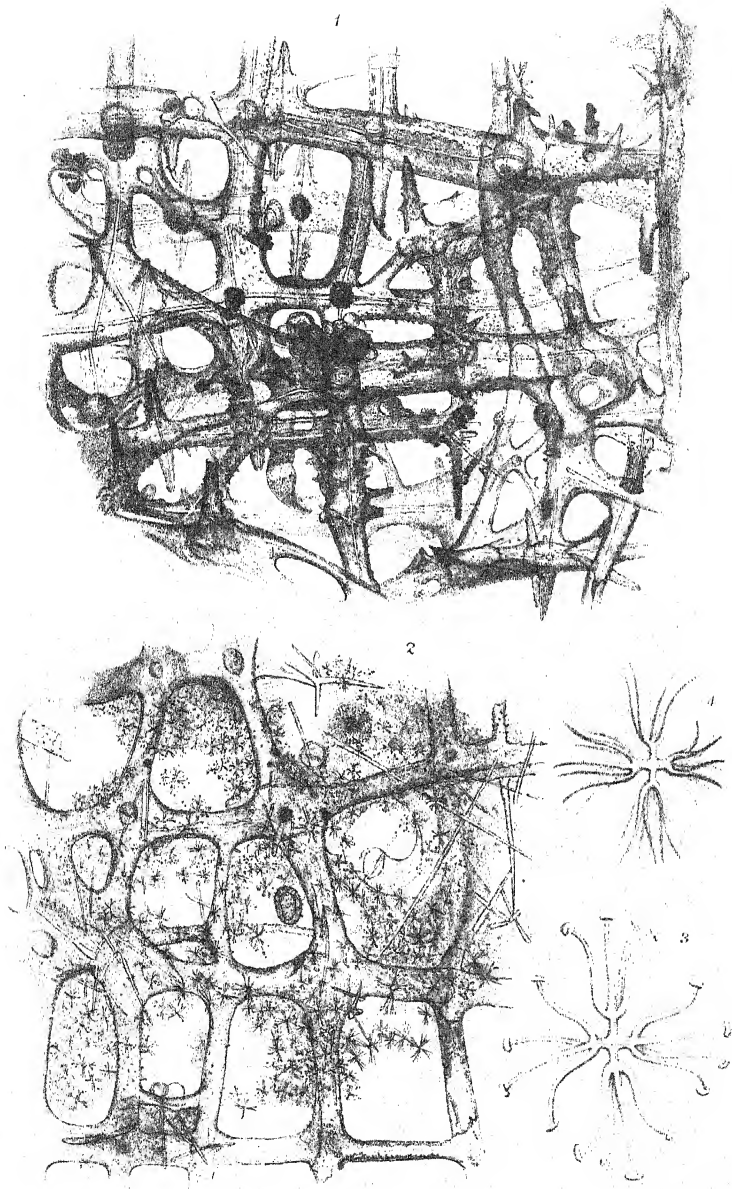
Sponge-form unknown. Dermal membrane unknown. External skeleton-surface (?) irregular; primary fibres branching and anastomosing, large and strong, armed irregularly with very large and strong, acutely conical spines; fibres and large spines mostly smooth, occasionally incipiently and minutely spinous; secondary fibres minutely spinous. Internal surface similar in character to the external one, but less strongly developed. Interstitial stratum—rete irregular, fibres more slender than those of the external surfaces, profusely minutely spinous, spines symmetrically disposed in about equidistant linear series in accordance with the long axis of the fibre. Sarcode dark amber brown.

Colour, in the dried state, dark amber.

*Hab.* West Indies, Captain Hunter, R.N.?

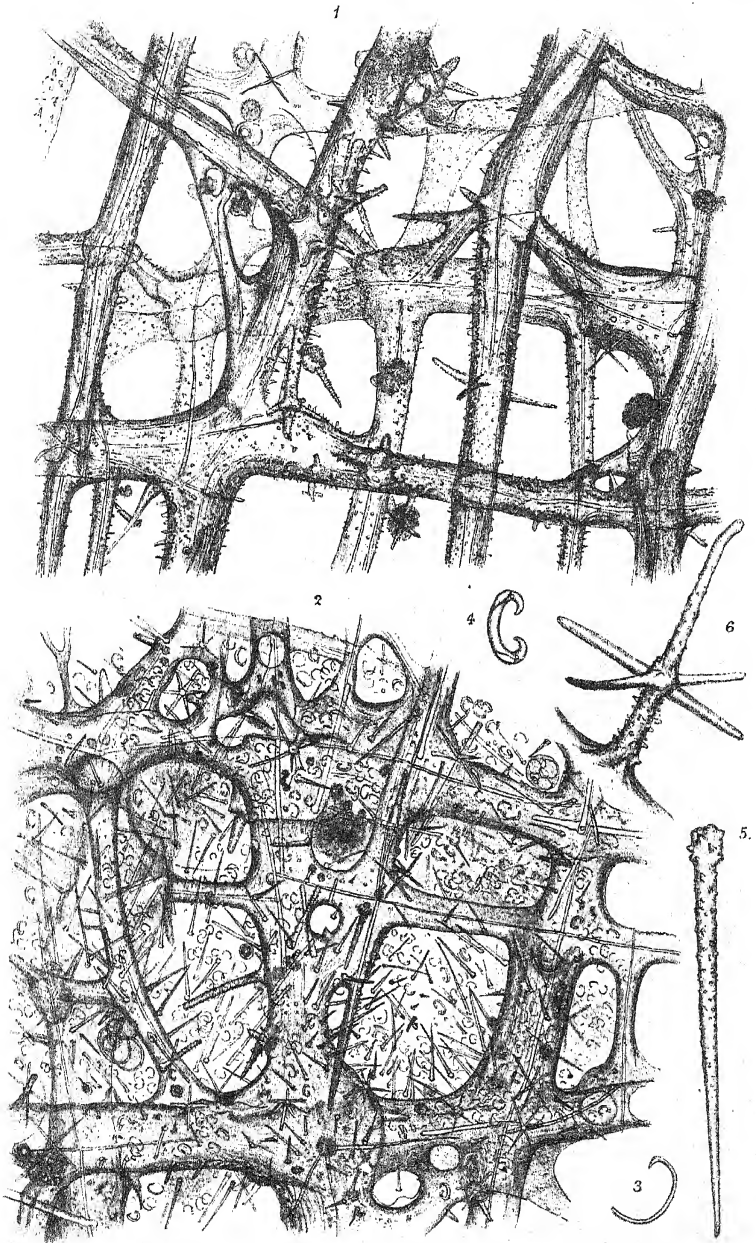
Examined in the dried state.

The specimen from which this species is characterized is a fragment seven lines in length, by four in greatest breadth; and it has every appearance of having been part of the side of a small cup-shaped Sponge. I have presumed that the surface having the stoutest fibres and the greatest amount of defensive armature is the external one. There are no indications of a symmetrical dermal rete, such as we find in some other species of *Farrea*; but the skeleton-fibres are quite in accordance with the structural peculiarities of those of many species of that genus, and I have therefore referred



*Farrea spinifera* 1. *F. spinulenta* 2-3.  
*Alcyonocellum speciosum* 4.





*Farrea aculeata* l. *F. robusta* 2-6.



it to *Farrea* until further information on the subject enables us to assign it more correctly to its proper place among the siliceo-fibrous sponges.

The primary skeleton-fibres are large and cylindrical, but of unequal diameter, and mostly have the appearance of transparent longitudinal striation from their strongly marked lines of growth, and they are more or less minutely spinous; their course is irregular, not running in straight lines, but in meandering ones, branching at intervals and again anastomosing with each other. Their large conical defensive organs are not all systematically projected outwards at about right angles to the dermal surface; some are so disposed, while others have a lateral direction, or are projected at various intermediate angles.

The central system of canals in the primary fibres is subject to considerable irregularity. Sometimes they are regularly confluent; at others they are produced in opposite directions, and their distal ends pass each other, and each has a cæcoid termination. It is not an unusual circumstance to see a short sexradiate arrangement of canals within one of the large fibres, as if the process of the production of new branches was first, the development of the canals within the parent fibre, and then the projection of the young offshoots in accordance with the nascent canals. In some cases there is not the slightest indication on the surface of the large fibre of the coming offshoot, while in others there is a very slight elevation on its surface immediately above the nascent canal; or the young shoot, in the form of an acutely conical projection, is unmistakably present with the continuation of the canal in its centre to its apex, where it usually appears to be open in the early stage of its development, with extremely delicate margins; but in a more advanced stage of its growth the apex becomes solid. These projections of young branches are readily to be distinguished from the conical external defences by their canals, while the defensive organs appear to be perfectly solid.

The inner external surface has the same characters as the outer one, but the dermal skeleton-fibres seem to be rather more slender. The intervening skeleton is more regular in its construction than the external layers. The reticulation is more regularly quadrate and the areas smaller. The fibres are also smaller and more profusely spinous; and the central canals are more continuous and confluent than those of the fibres of the external surface, and in some parts they are densely coated with dark-coloured opaque sarcodæ. I could not detect the slightest traces of any detached spicula amidst the structures.

This interesting specimen is in the cabinet of my friend Mr. H. Deane, who, I believe, received it with other specimens from Captain Hunter, R.N.

Since the above description was written, I have received another specimen of this species from my friend Mr. Deane. It is about four lines square, and is closely attached by one of its broad surfaces to the side of a small fragment of a *Vermetus*, and does not exhibit

traces of any pedicel. In every anatomical character it is in close accordance with the type specimen. A portion of this specimen is quite obscured by a crowd of Foraminifera and Polycistina entangled in the areas of the skeleton-rete.

The decease of my friend Mr. Deane does not allow of my determining the locality of this species with certainty; but I am strongly of opinion that it was collected by Captain Hunter in the West Indies, along with *Farrea Gassioti* and other similar specimens.

*FARREA SPINULENTA.* (Plate LXI. figs. 2 & 3.)

Sponge-mass unknown. Dermis furnished with a quadrilateral siliceo-fibrous network, armed at the angles oppositely externally and internally with imbricated elongate-conical spicular defences. Fibre solid, without canals, minutely spinous; spines acutely conical, rather numerous, symmetrically disposed. Dermal membrane thin, translucent, abundantly furnished with spinulo-quadrifurcate sexradiate stellate retentive spicula dispersed. Interstitial spicula large, simple, rectangulate, sexradiate; radii acerate, more or less spinous. Sarcode light brown.

Colour, in the dried state, light brown.

*Hab.* Tripoli (*Captain C. Tyler*).

Examined in the dried state.

The portion of the sponge representing this very interesting species is not quite the eighth of an inch in diameter. It was presented to my friend Captain Charles Tyler by Mr. Deane. It was found off the coast of Tripoli. The specimen is but a minute portion of the dermis of a sponge the mass of which is unknown to us; but the nature of the structures displayed by its microscopical examination unmistakably indicates that it belongs to the genus *Farrea*. The quadrilateral siliceo-fibrous network of the dermal rete accords in form very closely with that of *Farrea occa*. The fibres in each species are solid; and, as in *F. occa*, the angles of the tissue, both externally and internally, are armed with imbricated conical spicular defences; but these organs are longer and more slender in their proportions than in those of *F. occa*.

Thus far they agree very closely in their structures. They differ from each other in other important characters. The fibres in *F. occa* are quite smooth, while those in the species under consideration are regularly and systematically spinous, forming a very important specific character. These spines are not irregularly dispersed; they are disposed in equidistant parallel lines, in accordance with the long axis of the fibre, the spines in each line being also at about equal distances from each other and opposite the middle of the intervening spaces of those in the lines on each side of them, so that their mode of disposition on the fibre is remarkably symmetrical and very characteristic. Other essential differences occur in the dermal membranes of the two species. In the quadrilateral, smooth, siliceo-fibrous network of the dermis of *F. occa*, described in the Proceedings of the Zoological Society of London for March 13, 1869,



p. 339, plate xxiv. fig. 7, there are some very small portions of the dermal membrane on parts not represented in the figure *in situ* on some of the angles of the rete, in which there were fragments of extraneous spicula of various forms embedded in the sarcode; but I could not detect any form among them that could be assigned with any degree of probability as belonging to that dermal membrane, while in that of that of the species under description the dermal membrane abounded with them. The form of these spinulo-quadrifurcate sexradiate stellate spicula is slender and very beautiful; and they are so numerous in some parts of the tissue, and so closely packed together, that their forms are completely obscured; but in other parts, where a few only occur, they may be frequently seen in a very perfect condition. They are very minute: one of the largest that was measured did not exceed in its extreme diameter  $\frac{1}{129}$  inch; and the quadrifurcate terminal spicula measured  $\frac{1}{20000}$  inch in diameter.

The large, simple rectangulate sexradiate interstitial spicula with spinous radii, a few of which are entangled in the inner surface of the dermal rete, also form efficient specific characters, none such having hitherto been found in *Farrea occa*.

*FARREA ACULEATA.* (Plate LXII. fig. 1.)

Sponge—form, dermal membrane, oscula, and pores unknown. Skeleton—primary fibres cylindrical, stout, branching, and anastomosing, furnished profusely with acutely conical spines irregularly dispersed, and with numerous long, slender defensive prickles projected in various directions, covered with minute spines, and also with numerous rectangulate sexradiate defensive organs, radii slender, entirely spinous; canals very slender, confluent, frequently obsolete. Secondary fibres the same as the primary ones, short and less in diameter.

Colour, in the dried state, dark amber?

*Hab.* West Indies (*Captain Hunter, R.N.?*).

Examined in the skeleton state.

The specimen, a portion of which is represented by fig. 1, Plate LXII., is 10 lines long, by 6½ wide. It has apparently formed part of a rather large-sized cup sponge. From the flatness of the specimen and the uniformity of the two surfaces, it cannot be determined with certainty which of the two was the outer or inhalant one; but I am inclined to believe that the figure represents a part of the outer surface; nor can its locality be accurately determined. The specimen was presented to me by my late friend Mr. Henry Deane, with several other siliceo-fibrous ones, including those from the West Indies collected by Captain Hunter, R.N.; and I am strongly inclined to believe the locality to be the same as that of *Farrea Gassioti*, lat. 14° 8' N., long. 77° 38' W., West Indies, 800 to 1000 fathoms.

The reticular skeleton of this species is very regular, by far the greatest number of the areas being square, and the fibres in both directions being of about the same diameter. There appears gene-

rally to be two layers of skeleton-structure; and occasionally a portion of a third layer may be seen between them; and this intermediate one appears to be very much less regular in its structure than either of the other two. The acutely conical spines on the fibres are not equally dispersed; on some parts they are very numerous, while on others they are much less in number. The aculei are very characteristic organs. They are of unequal length, and irregular in their mode of disposition. On some fibres a single one is projected; on others there are two on opposite sides of the fibre; and sometimes there are three or four developed in directions opposite to each other. They are rather slender, and attenuate gradually from the base to the distal extremity, which is frequently very slender and acute. The rectangulate sexradiate defensive organs are numerous; they are of nearly equal size, and are disposed irregularly among the fibres; but they are mostly projected into the square areas of the skeleton-rete. The canals in the skeleton-fibres are very slender, and in many of the large ones they are partially or entirely obsolete.

I know of no other species for which *F. aculeata* might be readily mistaken except *F. spinifera*. The former species differs from the latter in the smallness and very much less-developed state of the canaliculation of its fibres, and in the far greater development of the minute spination of its skeleton—also in the abundance in the former species of the rectangulate sexradiate internal defences, while in the latter they appear to be totally absent.

**FARREA ROBUSTA.** (Plate LXII. figs. 2-6.)

Sponge—form cup-shaped? surface minutely hispid. Oscula and pores unknown. Dermal membrane thin and pellucid, abundantly spiculous; tension-spicula long and very slender, subclavate, cylindrical, very few in number; retentive spicula simple and contort, bihamate, small and slender, dispersed, rather numerous, and bidentate equianchorate small and few in number; furnished also with numerous internal defensive spicula of subspinulate, attenuato-acuate forms, entirely incipiently spinous, projected at various angles from the inner surface of the membrane.

Skeleton—fibres very large and strong, cylindrical, sparingly spinous or aculeated; aculei short and slender, dispersed; armed abundantly with rectangulate sexradiate defensive organs, radii slender, attenuated, incipiently spinous. Rete more or less quadrangular, areas frequently very little more in breadth than the diameters of the skeleton-fibres. Central canals small.

Colour, in the dried state, dark amber.

*Hab.* West Indies (*Captain Hunter, R.N.?*).

Examined in the skeleton state.

I have seen only a single specimen of this remarkable sponge. It was given, with other specimens, by the late Mr. Henry Deane to my friend Captain Charles Tyler, who kindly presented it to me for description and publication. It consists of a thin plate of siliceo-fibrous

structure of an irregular form, of an average diameter of half an inch. It is constructed of two, and in some parts of three, layers of rete, the intermediate layer, when present, having its fibres more slender and more irregularly disposed than the two external ones. The fibres of the outer structures are remarkably large and strong; an average-sized one measured  $\frac{1}{125}$  in. in diameter; and the rete is more than usually close and compact; in many cases the areas do not exceed in breadth the diameter of the surrounding fibres. The form of the rete is mostly either square or oblong; and its strength is greatly increased by the interior angles being replaced by curves, so that the areas are to a great extent either circular or oval. The external layer of tissue is sparingly spinous, and is also furnished with short and slender aculei, and abundantly with rectangulate sexradiate defensive organs, based most frequently on the sides of the fibres and projected thence into the areas of the network; and the aculei are apparently the nascent state of these organs.

There are strong appearances of the specimen having been part of a cup-shaped sponge; at one portion of it the skeleton-rete is closely and irregularly as it were crushed together; from this part the primary skeleton-fibres radiate in a fan-shaped mode, the secondary ones assume the state of a series of concentric curves, and the reticulation increases in regularity of structure as it approaches what has evidently been the distal portion of the cup-shaped structure; and here it is that we find the dermal membrane and its characteristic spicula in the finest state of preservation.

The dermal membrane is extremely pellucid, and would scarcely be visible if it were not for the numerous retentive spicula adherent to its surface.

The bihamate retentive spicula are numerous, uniform in size, and very slender; their curves are about three fourths of a circle; and they are equably dispersed over the surface of the membrane. They do not exceed  $\frac{1}{87}$  inch in length. The minute bidentate anchorate ones are very few in number; one of the largest of them measured  $\frac{1}{1000}$  inch in length: they vary in their mode of development to some extent; and occasionally there is a third, small tooth, more or less produced, between the two large lateral ones. The attenuato-subspinulate internal defensive spicula are also very numerous; they vary somewhat in size, and are entirely incipiently spinous; one of the largest measured  $\frac{1}{50}$  inch in length; they are based on the inner surface of the dermal membrane, and are projected inwards at various angles, while others are seated on the sides of the dermal skeleton-rete, and are projected into the areas at various angles. The whole three forms abound, not only on those parts of the membrane covering the areas of the reticulations of the fibres, but they also occur on the parts attached to the skeleton-fibres, so that no part of the dermal membrane is left unprotected.

The central canals of the skeleton-fibres are small; they vary to a slight extent in some parts of the rete, and in some of the largest of the fibres they are entirely obsolete.

The rectangulate sexradiate organs are not very numerous near

the external surface of the sponge, but they occur in considerable numbers on the more deeply situated portions of the skeleton-fibres, whence they are projected into the areas of the skeleton-rete. They vary considerably in the amount of their development: some are comparatively short, and have their lateral radii widely spread; and these are abundantly spinous; while others are taller and have slender and nearly smooth radii. The dimensions of one of the stouter forms was  $\frac{1}{2}\frac{1}{10}$  inch high, with a lateral spread of  $\frac{1}{2}\frac{1}{10}$  inch.

There is no species among those which are most nearly allied to the one in course of description with which it is likely to be confounded. The robust form of its skeleton, and the peculiarities of its membranes and its other organs strikingly distinguish the species.

The abundance and variety of the forms of defensive spicula in this sponge present a striking evidence of the futility of attempting to arrange the Spongiadæ by the forms of their auxiliary spicula, as it has been suggested by some imaginative naturalists. Systems founded on such bases look very learned and imposing upon paper, but when applied to the accurate discrimination of species they prove quite inadequate to their proposed purpose.

In such sponges as the one under consideration, which have exceedingly thin parietes, and but comparatively small portions of soft tissues, it becomes necessary that those vital parts should be taken especial care of; and hence the profusion and variety of these minute defensive spicula to protect the vital parts, otherwise so much exposed to the numerous minute predatory creatures that exist so abundantly around them; and hence it is that nature has in each case provided the defences most suitable to the various species, without reference to any particular type of sponges, and those only most appropriate to the purpose of the preservation of the membranous and sarcodous organs so essential to the individual's existence. In the species in course of description, we have not only the usual rectangulate sexradiate organs of defence common to so many siliceo-fibrous sponges, but we also have, in addition to them, those which are so frequently appropriated to *Halichondria* and many other genera differing widely in their structures from each other, to render the preservation of the delicate membranous organs of this species completely certain. In other species of siliceo-fibrous sponges of similarly delicate structure we have the floricomosexradiate stellate forms, as in *Farrea spinulenta*, which are so plentiful in several species of *Geodia*, a genus differing widely in its structural peculiarities from *Farrea* and other kindred genera.

A slight doubt exists as to the true locality of this sponge, which the decease of my late friend Mr. Henry Deane does not allow us to clear up. When Captain Tyler received the specimen from Mr. Deane, he received others of a similar description from the coast of Tripoli; but he is strongly of opinion that this species was among those that were brought up on the cable by Captain Hunter in lat.  $14^{\circ} 8' N.$ , long.  $77^{\circ} 38' W.$  from 800 to 1000 fathoms depth.

EXPLANATION OF THE PLATES.

PLATE LXI.

- Fig. 1 represents a view of a portion of the external surface of the late Mr. Henry Deane's specimen of *Farrea spinifera*,  $\times 61$  linear.  
 Fig. 2 represents a portion of the dermal surface of *Farrea spinulenta*, with its numerous quadrifurcate spinulo-sexradiate stellate retentive spicula,  $\times 80$  linear.  
 Fig. 3. One of the quadrifurcate spinulo-sexradiate stellate spicula,  $\times 666$  linear.  
 Fig. 4. A sexradiate stellate spiculum with attenuated radii, from *Aleyoncellum speciosum*, to compare with those of *Farrea spinulenta*,  $\times 666$  linear.

PLATE LXII.

- Fig. 1. A portion of the skeleton-rete of *Farrea aculeata*, exhibiting the general structure of the sponge and the characteristic mode of disposition of the aculei,  $\times 61$  linear.  
 Fig. 2 represents a portion of the outer or inhalant surface of *Farrea robusta*, with the dermal membrane in a fine state of preservation, with its numerous retentive and defensive spicula *in situ*,  $\times 80$  linear.  
 Fig. 3. One of the contort bilaminate retentive spicula,  $\times 666$  linear.  
 Fig. 4. One of the minute bidentate equianchorate retentive spicula,  $\times 666$  linear.  
 Fig. 5. A fully developed subspinulate attenuato-acuate internal defensive spiculum, entirely but incipiently spinous,  $\times 666$  linear.  
 Fig. 6. One of the rectangulate sexradiate internal defensive organs, entirely but incipiently spinous, based on a portion of the skeleton-fibre, and projected into one of the areas of the skeleton-rete,  $\times 666$ .

November 16, 1875.

Dr. Günther, F.R.S., V.P., in the Chair.

The Secretary read the following report on the additions to the Society's Menagerie during the month of October 1875.

The total number of registered additions to the Society's Menagerie during the month of October was 73, of which 39 were by presentation, 16 by purchase, 2 by exchange, 5 by birth, and 11 were received on deposit. The total number of departures during the same period, by death and removals, was 130.

The most noticeable additions during the month of October were as follows:—

1. A Scolopaceous Courlan (*Aramus scolopaceus*) from South America, purchased 6th October, 1875. This bird was in a very weak condition when received, and did not live long, but is of interest as being the first example of this aberrant form yet received alive.

2. A Binturong, from Malacca, presented by Capt. A. R. Ord, October 19th. We have likewise now in the Gardens a Grey Binturong (*Arctictis albifrons*, F. Cuv.) from Borneo, presented by Sir Harry Ord in 1873; so that we may hope eventually to solve the question whether this and the Black Binturong (*A. binturong*) are really different species, as considered by F. Cuvier, or mere varieties.

Mr. Sclater exhibited the upper horn of a two-horned Rhinoceros that had been shot in March last by Lieut.-Col. C. Napier Sturt, F.Z.S. in the valley of the Brahmapootra, about 40 or 50 miles north-east of Dohbree, when in company with Mr. Archibald Campbell, Deputy-Commissioner of Dohbree, and Mr. Williamson, Governor of the Towra Hills. The place where the Rhinoceros was found was near the gorge where the Sunkos river issues from the Bhotan range, and is actually within the old boundary of Bhotan.

Mr. Sclater remarked that this seemed to prove conclusively the existence of a two-horned species of Rhinoceros in Assam, which would probably turn out to be the same as that from Chittagong, now living in the Society's Gardens.

Mr. Sclater read an extract of a letter addressed to him by M. le Dr. N. Funck, Director of the Zoological Garden, Cologne. Dr. Funck stated that the bird figured in Mr. Sclater's article on the Curassows, recently published in the Society's 'Transactions' (vol. ix. pl. 53) as *Pauxis galeata*, var. *rubra*, was the true female of *P. galeata*. Dr. Funck had traversed the district inhabited by this species from Puerto Cabello in Venezuela, to Valencia and Truxillo\*, and had killed upwards of 50 individuals; amongst these were many females, shot at the side of the males, coloured exactly as the above-mentioned figure.

Under these circumstances, Mr. Sclater was now inclined to believe that the case of the female resembling the male in plumage, of which two instances were given in the article above mentioned, was abnormal, corresponding to that known to occur occasionally in the females of other birds.

Mr. Seebohm, F.Z.S., exhibited a series of rare and interesting birds and eggs from the tundras and deltas of the Petchora river, North-Eastern Russia, collected there by Mr. J. A. Harvie-Brown and himself during the present year. The following were the chief objects:—The eggs and young in down of the Grey Plover (*Squatarola helvetica*); the nest, eggs, and young in down of the Little Stint (*Tringa minuta*); the eggs of Bewick's Swan (*Cygnus bewickii*); skins, nest, and eggs of *Phylloscopus tristis* (new to the European fauna); skins, nest, and eggs of a new species of *Anthus*, which Mr. Dresser has named *A. seebohmi*, after its discoverer; skins, nest, and eggs of the Yellow-headed Wagtail (*Motacilla citreola*); skins of *Parus kamschatkensis*; skins of a Herring-Gull, differing specifically from *Larus argentatus* and *L. leucophæus*, and probably identical with *Larus cachinnans* of Pallas.

Eggs and down of ten species of Ducks, including the Smew (*Mergus albellus*), obtained in the valley of the Petchora were likewise exhibited.

\* Dr. Funck states that *Pauxis galeata* is abundant in the forests from San Estevan (one league from Puerto Cabello) up to the Cumbre of Valencia, i. e. from 1000 to 3000 feet in altitude, and likewise in the mountains of Noigua and Montalban in the same province.

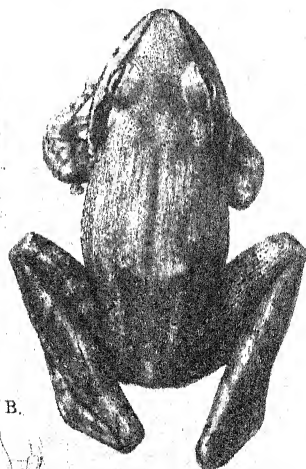
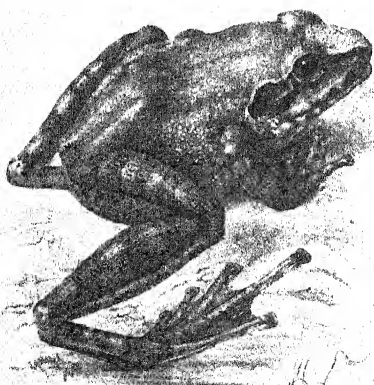
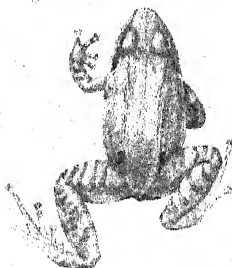




A.



C.



B.



G.H. Ford.

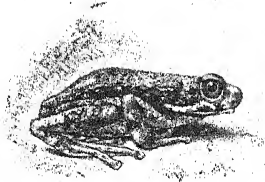
Mutern Bros. imp.

A. ANSONIA ORNATA B. POLYPEDATES BEDDOMII C. IXALUS DIPLOSTICTUS.





B.



C.



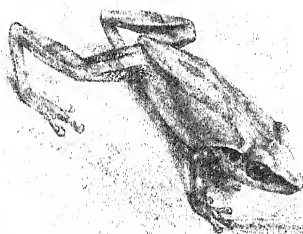
A.







B.



C.



A.



G.H. Ford.

Mintern Bros. imp.

A. IXALUS MONTIANUS. B. IXALUS CHALAZODES. C. IXALUS STICTOMERUS.

Mr. A. H. Garrod read a paper on the structure of the Manatee (*Manatus americanus*) lately living in the Society's Gardens. Mr. Garrod drew attention to a peculiarity in the mechanism of the upper lip, by which that structure is capable, through the combined transverse movements of the lateral pads which compose it, of employing the lips as an independent prehensile organ. The size of the blood-disks was also given, together with drawings of the external and internal conformation of the brain.

This paper will be printed in the Society's Transactions.

The following papers were read:—

1. Third Report on Collections of Indian Reptiles obtained by the British Museum. By Dr. ALBERT GÜNTHER, V.P.R.S., V.P.Z.S.

[Received October 19, 1875.]

(Plates LXIII.—LXVI.)

In my second Report (see above, p. 224) I have treated of Lizards and Snakes collected by Lieut.-Col. Beddome and the late Mr. Jerdon. The present paper is a continuation of the account of these collections, and treats of the Batrachians.

*RANA GRACILIS* (Wieg.).

I consider *Rana agricola* (Jerd.) and *Rana nilgirica* (Jerd.) varieties of this species, which is remarkable for the amount of variation in the length of the limbs and toes.

*RANA TIGRINA* (Daud.).

A specimen named by Mr. Jerdon, and representing his "*Rana crassa*" belongs to this species.

*RANA LIEBIGII* (Gthr.).

I regard *Rana sikkimensis* (Jerd.) as not specifically distinct from *Rana liebigii*.

*RANA VERRUCOSA*, sp. n.

Snout of moderate length, somewhat pointed, with indistinct canthus rostralis; tympanum rather small, smaller than the eye. Inner nares not quite so wide as the Eustachian tubes. Vomerine teeth in two oblique series, each commencing from the front margin of the inner nostril. Upper parts covered with numerous larger and smaller warts, tubercles, and short folds. Limbs well developed, the distance between vent and heel being equal to the length of the body. Tips of the fingers and toes scarcely swollen; the fourth toe one third longer than the fifth. Toes completely webbed; but the web does not extend to the extremity of the fourth toe. Metatarsus with an elongate inner and a minute outer tubercle.

Brownish, marbled with darker, sometimes with a broad yellow vertebral band. Limbs with cross bars; hinder part of the thighs black, with white vermiculated lines and spots. Lower parts whitish, throat sometimes marbled with brown.

Several specimens were collected by Lieut.-Col. Beddome in Malabar. The body of the largest is 60 millims. long; length of hind limb 103 millims.

*RANA PYGMÆA*, sp. n.

Similar in habit to a young *Rana kuhlii*. Head much depressed, with very short, rounded snout; canthus rostralis absent; eyes prominent, obliquely directed forwards. Skin smooth, with a few irregular folds behind the head. Tympanum hidden; inner nares and Eustachian tubes small. Vomerine teeth in two short groups close together, behind the inner nostrils. Limbs short; fingers and toes short, the latter half-webbed. One metatarsal tubercle. Upper parts nearly uniformly black or blackish brown, the lower dull yellow.

A minute species, the body of an adult female with mature ova in the oviduct being only 25 millims. long; length of hind limb 31 millims.

Several specimens were collected by Lieut.-Col. Beddome in Malabar.

*RANA HEXADACTYLA* (Less.).

The specimens named *Rana vittata* by Lieut.-Col. Beddome are the young of this species. Three other young specimens were presented to the Museum by Mr. Jerdon under the name of "*Pyxi-cephalus pluvialis*, Jerd."

*XENOPHRYS MONTICOLA* (Gthr.).

"*Xenophrys gigas*, Jerd.," is the adult of this species.

*DIPLOPELMA*.

In Mr. Jerdon's collection there are specimens which he has identified with the two species formerly named by him "*Engystoma rubrum*" and "*Engystoma carnatium*." Those to which he has applied the former name are, in my opinion, the same as *D. ornatum* (D. and B., Gthr.). The others, four in number, are from Assam; and two of them I am inclined to refer likewise to *D. ornatum*, whilst the other two are identical with *D. pulchrum* (Hallow.).

*NANNOPHRYS CEYLONENSIS* (Gthr.).

*Trachycephalus ceylanicus*, Ferguson, Ann. & Mag. Nat. Hist. 1875, vol. xv., is identical with this species.

*ANSONIA ORNATA*, sp. n. (Plate LXIII. fig. A.)

Anterior half of the back finely tubercular, the remainder smooth. Tympanum very distinct, about half the size of the eye. Fingers free, the first much shorter than the second. Toes short, broadly

webbed; two small metatarsal tubercles, no tarsal fold. Black; upper side of the head generally grey or with some greyish spots. Throat, abdomen, and the lower side of the legs with large bright yellow spots.

Several specimens were obtained by Lieut.-Col. Beddome from the Brumagherries.

	millim.
Length of body .....	30
„ hind limb .....	44
„ tarsus .....	8
„ fourth toe .....	12

*BUFO BEDDOMII*, sp. n.

Crown broad, flat, without bony enlargement. Snout short, projecting, with well marked canthus rostralis. Limbs of moderate length. The first and fourth fingers a little longer than the second. Toes broadly webbed. Metatarsus with two small callosities; no fold along the tarsus. All the upper parts covered with rough tubercles; parotoid ovate; about twice as long as broad. Tympanum very small; Eustachian tubes much narrower than choanæ. Above dark brown, with some indistinct black spots; the two inner fingers and the three inner toes whitish above. Lower parts whitish, densely marbled with black.

One specimen was obtained by Col. Beddome in Malabar; it is 43 millims. long; hind limb 61 millims.

*BUFO HOLOLIUS*, sp. n. (Plate LXIV. fig. A.)

Crown broad, flat, without bony enlargement. Snout short, depressed, projecting, with well marked canthus rostralis. Limbs and fingers rather short; the fourth finger a little longer than the second. Toes short, webbed at the base only. Metatarsus with two small callosities; no fold along the edge of the tarsus. Back with very flat, smooth, small glandular patches; also the parotoid is flat, scarcely raised above the level of the smooth skin. Tympanum perfectly circular, very distinct, not much smaller than the eye. Inner nares and Eustachian tubes narrow. Upper parts olive-coloured, marbled with brown; lower parts whitish.

One specimen was found by Col. Beddome in Malabar; it is 38 millims. long; hind limb 45 millims.

*HYLORANA TEMPORALIS* (Gthr.).

Specimens collected by Col. Beddome in the Anamallays, and determined as "*Hylorana flavescens*" by Mr. Jerdon in 1870, prove to differ from *H. temporalis* only by having the brown temporal band extended on to the sides of the body. There is no evidence whatever that this is the frog "with the yellow sides" named "*Rana flavescens*" by Mr. Jerdon in 1854.

*POLYPEDATES CHLORONOTUS*, sp. n. (Plate LXV. fig. A.)

In habit somewhat resembling a *Hylorana*.

Snout of moderate length, somewhat pointed, with distinct canthus rostralis, and vertical, concave loreal region. Eye large. Tympanum one third the size of the eye in females, but larger in males. Limbs strong; disks well developed, those of the fingers rather larger than those of the toes. Fingers not webbed, the first rather longer than the second, and equal in length to the fourth, the third being the longest. Toes completely webbed; a single elongate metatarsal tubercle. Skin quite smooth, not adherent to the surface of the head; no indication of a curved osseous crest. Choanæ and Eustachian tubes of moderate width; vomerine teeth in two oblique series between the choanæ. Tongue without free papilla. Male with an external vocal sac behind each angle of the mouth. Upper surface of the head and back green (sometimes with some irregular black spots); sides of the head and body and the limbs dark brown, this colour being sharply defined towards the green of the back; lower parts whitish, with the throat and chest brownish. A white line along the upper lip towards the axil. Loins and hind part of the thighs marbled with whitish. Legs with dark cross bars above.

	Male. millim.	Female. millim.
Length of body . . . . .	51	93
„ hind limb . . . . .	93	175
„ tarsus . . . . .	15	28
„ fourth toe . . . . .	27	50

Several specimens were brought by Mr. Jerdon from Darjeeling.

This is the frog mentioned by Mr. Jerdon (Proc. As. Soc. 1870, p. 83) and described by Dr. Anderson (Proc. Zool. Soc. 1871, p. 208) as *Polypedates smaragdinus* of Blyth; but there is no evidence whatever that Blyth had this species before him; he merely says (Journ. As. Soc. Beng. xxi. p. 355):—"A tree-frog from the Naga hills, Assam (*P. smaragdinus*, nobis). Length of the body  $3\frac{1}{4}$  inches, hind limb  $5\frac{1}{4}$  inches. Wholly green above, changing in spirit to livid blue, underparts white." This vague diagnosis may apply to very different species, and certainly better to some than to the present frog from Darjeeling.

*POLYPEDATES FORMOSUS*, sp. n. (Plate LXV. fig. B.)

Habit similar to that of *P. afghana*.

Snout flat, short, rounded, with distinct canthus rostralis. Loreal region subvertical, with a very slight impression. Eye of moderate size; tympanum very small, only as large as the disk of the third finger. Limbs slender; fingers exceedingly long: the second longer than the first, but shorter than the fourth, the third exceeding the others in length; fingers not webbed, with large disks, larger than those of the toes. Toes fully webbed; metatarsal tubercle indistinct. Skin quite smooth. Choanæ and Eustachian tubes narrow; vomerine teeth in two very short groups between the choanæ. Tongue without free papilla. Upper parts green, mar-

bled with black, the black spots enclosing a number of small whitish dots. Legs and toes with black white-dotted cross bars. Lower parts light greenish, irregularly marbled with brown.

	millim.
Length of body . . . . .	64
„ third finger . . . . .	21
„ hind limb . . . . .	115
„ tarsus . . . . .	19
„ fourth toe . . . . .	37

One specimen from Khassya in Mr. Jerdon's collection.

*POLYPEDATES JERDONII*, sp. n.

Snout broad, depressed, extremely short and obtuse, with indistinct canthus rostralis, and flat, slanting loreal region. Eye of moderate size; tympanum very small, much smaller than one of the digital disks. Limbs of moderate length; disks large, nearly equally large on the fingers and toes. Fingers conspicuously webbed at the base: second and fourth equal in length, a little longer than the first, and shorter than the third. Toes two thirds webbed; one ovate metatarsal tubercle. Skin nearly smooth above, granular below. Choanæ and Eustachian tubes narrow; vomerine teeth in two oblique series between the choanæ. No free papilla on the tongue. Upper parts brownish grey; forehead and an irregular broad band on each side whitish. Whitish below, throat with some brownish spots; anterior and posterior sides of the femur nearly colourless. Dark bars across the legs irregular and sometimes confluent.

	millim.
Length of body . . . . .	48
„ hind limb . . . . .	68
„ tarsus . . . . .	11
„ fourth toe . . . . .	22

Two specimens from Darjeeling, in Mr. Jerdon's collection.

*POLYPEDATES BEDDOMII*, sp. n. (Plate LXIII. fig. B.)

Habit similar to that of *P. maculatus*.

Snout flat, moderately long, rather obtuse, with distinct canthus rostralis. Loreal region flat, slanting. Eye rather large; tympanum at least half as large as the eye. Limbs strong and rather long; second finger rather shorter than first, which nearly equals the fourth; third longest of all. Fingers without any web, but with the disks well developed. Toes two thirds webbed, the cutaneous fold reaching to the disks, except in the fourth toe, in which it extends to the antepenultimate joint only. Metatarsus with an indistinct, elongate tubercle. Skin of the back with short longitudinal folds; a glandular curved fold from behind the orbit above the tympanum, to the armpit. Choanæ and Eustachian tubes rather small; vomerine teeth in two short, scarcely oblique series, between the choanæ. A long, free, pointed, conical papilla on the



middle of the tongue\*. Upper parts light brownish olive, or pinkish, with some very obscure spots; a dark cross band between the eyes; a black band along the canthus rostralis, widening behind the eye, so as to cover the whole tympanum; legs obscurely barred; anterior and posterior sides of the thighs finely mottled with black.

	Spec. A. millim.	Spec. B. millim.
Length of body . . . . .	55	45
„ hind limb . . . . .	115	85
„ tarsus . . . . .	11	13
„ fourth toe . . . . .	30	24

Lieut.-Col. Beddome has collected specimens of this frog in Malabar and Travancore, in the Anamallays, and at Sevagherry.

#### POLYPEDATES BRACHYTARSUS, sp. n.

Closely allied to *P. beddomii*, but with a much shorter tarsus. Snout flat, somewhat pointed, with indistinct canthus rostralis; loreal region flat, slanting. Eye rather large; tympanum not quite half as large as the eye. Limbs of moderate length. Fingers without any web, and with moderately developed disks; the first, second, and fourth nearly equal in length, the third being the longest. Toes two thirds webbed, the cutaneous fold reaching to the disks, except in the fourth toe, in which it extends to the antepenultimate joint only. Metatarsus with a small indistinct tubercle. Skin of the back with short longitudinal folds; a glandular curved fold from behind the orbit, above the tympanum, to the armpit. Choanæ and Eustachian tubes of moderate size; vomerine teeth in two short oblique series. A free, pointed papilla in the middle of the tongue. Upper parts brown, mottled with darker; a broad, whitish, well-defined longitudinal band along the middle of the back to the end of the snout; an interocular brown band slightly encroaches upon the white band. Upper sides of the legs barred as usual; anterior and posterior sides of the thighs finely mottled with brown.

	Spec. A. millim.	Spec. B. millim.
Length of body . . . . .	55	38
„ hind limb . . . . .	99	58
„ tarsus . . . . .	15	10
„ fourth toe . . . . .	26	17

Two specimens from Lieut.-Col. Beddome's collection—one from the Anamallays, the other from Sevagherry.

#### POLYPEDATES BREVIPALMATUS, sp. n.

Habit similar to that of *P. maculatus*.

Snout short, flat, obtuse, with indistinct canthus rostralis; loreal

\* I do not find that the presence of this papilla has been noticed before, although it is present in some of the other species of *Polypedates* and *Ixalus*; it is absent in *P. maculatus*. I do not know its function.

region flat, slanting. Eye of moderate size; tympanum about one third the size of the eye. Limbs of moderate length; disks rather small. Fingers without any web: the second rather longer than the first, and equal to the fourth, the third being the longest. Toes long, with a very short web. Metatarsal tubercle elongate. Skin of the back more or less tubercular, or nearly smooth. Choanæ and Eustachian tubes rather narrow; vomerine teeth in two very short series between the choanæ. A free, pointed papilla in the middle of the tongue. Upper parts brownish olive, mottled with brown; a dark interocular cross band; legs barred as usual. Lower parts more or less marbled with brown, sometimes brown with white dots, sometimes uniform whitish; anterior and posterior sides of the thighs mottled with brown.

	Spec. A. millim.	Spec. B. millim.
Length of body . . . . .	44	34
„ hind limb . . . . .	86	64
„ tarsus . . . . .	14	11
„ fourth toe . . . . .	25	19

Several specimens were collected by Lieut.-Col. Beddome in Malabar, and one in the Anamallays.

#### IXALUS VARIABILIS (Gthr.).

This species is not confined to Ceylon, but occurs in various parts of Southern India; it is common at Pycara. The variations of colour are endless, and frequently render the determination a task all the more difficult, as some of them approach closely the distribution of colours in other species. There are specimens with sub-crescentic brown bands on the back as in *Polypedates microtypanum*; others have round, milk-white spots about the lips, or on the sides, or all over the back. One variety has the back of a nearly uniform chocolate-brown, and a light-coloured band along each side. A whitish line along the canthus rostralis and superciliary margin is very frequent.

It is possible that the specimens which Mr. Jerdon noticed as *Phyllomedusa* (?) *wynaadensis* belonged to this species. But in a genus in which the distinction of closely allied species is most difficult for the zoologist with the specimens before him, it is impossible to say to which of them a short, insufficient note, penned 25 years ago, refers.

#### IXALUS GLANDULOSUS (Jerd.).

The specimens we have received from Mr. Theobald of this species were identified by him as the *Ixalus* (?) *glandulosa* of Jerdon—and, as I think, very properly, the sides of the specimens being largely glandular. On the other hand, Col. Beddome has collected specimens of the same species, which were determined by Mr. Jerdon himself as his *Phyllomedusa* (?) *tinniens*. It will be difficult to decide from the original notes with which these names are accompa-

nied which of the two names ought to be applied, or whether they are synonyms.

*IXALUS MONTANUS*, sp. n. (Plate LXVI. fig. A.)

Snout short, as long as the eye, obtusely rounded in front, with distinct canthus rostralis. Tongue with a free, pointed papilla in the anterior part of the median line. Tympanum hidden below the skin. Skin nearly smooth, only in adult examples with some indistinct tubercles. The length of the body is more than the distance between vent and heel. No fold along the tarsus; metatarsus with a small, indistinct tubercle; fingers quite free; toes with a very short web; disks of moderate size. Old examples are nearly entirely of a dark purplish brown above, with scarcely any markings, the posterior side of the femur being marbled with black. Other specimens are of a lighter colour, with more or less symmetrical brown markings, the forehead being light-coloured. Abdomen sometimes uniform whitish, sometimes more or less reticulated with black.

Lieut.-Col. Beddome obtained this species on the Kudra Mukh, at an elevation of 6000 feet. One of the largest specimens is 38 millims. long, the length of the hind limb being 55 millims.

*IXALUS DIPLOSTICTUS*, sp. n. (Plate LXIII. fig. C.)

Snout of moderate length, rather pointed, with distinct canthus rostralis. Tongue with a free, pointed papilla in the anterior part of the median line. Tympanum distinct, not quite half the size of the eye. Skin of the back with some longitudinal folds. The length of the body equals the distance between vent and heel. A cutaneous fold along the tarsus, commencing from the single metatarsal tubercle; fingers quite free; toes slender, with a very short web. Disks small. Pinkish olive-coloured, with a black line along the canthus rostralis, broader behind the eye, and continued over the tympanum. Symmetrical black spots on the sides—one in front of the axil, another on the middle of the side of the trunk, a third above the loin; one or the other of these spots may be absent. Legs with dark cross bars; anal region and soles of the feet black. Abdomen light-coloured; throat sometimes mottled with brown.

Several specimens were collected by Lieut.-Col. Beddome in Malabar. One of the largest is 27 millims. long, the length of the hind limb being 46 millims.

*IXALUS CHALAZODES*, sp. n. (Plate LXVI. fig. B.)

Snout short, as long as the eye, obtusely rounded in front, with indistinct canthus rostralis. Tongue with a free, pointed papilla in the anterior part of the median line. Tympanum covered by the skin. Skin smooth; but in the inguinal region there are several series of white, smooth tubercles; several smaller similar tubercles in the anal region and along the tarsus; the length of the body is equal to the distance between vent and heel; no fold along the tarsus; metatarsus with a small indistinct tubercle; fingers quite free; toes half-

webbed; disks large. Upper parts uniform greenish, the tubercles mentioned showing like white dots. Lower parts yellowish white. The anterior and posterior sides of the femur yellow, slightly marbled with green.

One adult female was obtained by Lieut.-Col. Beddome from Travancore; it is 26 millims. long, the length of the hind limb being 42 millims.

*IXALUS JERDONII*, sp. n.

Snout very short, somewhat pointed, with distinct canthus rostralis. Tongue with a free pointed papilla in the anterior part of the median line. Tympanum extremely small, but distinct. Skin smooth. The length of the body is rather more than the distance between vent and heel. No fold along the tarsus; metatarsal tubercle small, indistinct; fingers with a rudimentary web; toes short, half-webbed. Disks moderately developed. Reddish olive, with indistinct darker markings on the back. Femur colourless in front and behind. Lower parts whitish. Length of body 43 millims., of hind limb 63 millims.

A single specimen from Jerdon's collection; on the bottle it was marked as coming from Darjeeling; but it is possible that this is the same specimen mentioned by Jerdon as having been found by him "in the Khasis," Proc. As. Soc. Beng. 1870, p. 85.

*IXALUS BEDDOMII*, sp. n.

Allied to *Ixalus femoralis* and *I. pulchellus*, but with a distinct canthus rostralis. Snout short, as long as the eye, obtusely rounded in front. Tongue without free pointed papilla in the middle. Tympanum very small, covered by the skin. Skin on the back smooth. The length of the body is nearly equal to the distance between vent and metatarsal joint. No fold along the tarsus; metatarsus with a small indistinct tubercle; fingers quite free; web between the toes very short; disks well developed. Upper parts uniform green, the lower whitish. The anterior and posterior sides of the femur are perfectly colourless; and only a narrow stripe along its upper side is green.

Several specimens, collected by Lieut.-Col. Beddome in Malabar, are 23 millims. long, the length of the hind limb being 35 millims.

*IXALUS STICTOMERUS*, sp. n. (Plate LXVI. fig. C.)

Snout of moderate length, rather pointed, with distinct canthus rostralis. Tongue without free pointed papilla in the middle. Tympanum very small, distinct. Skin smooth. The length of the body is less than the distance between vent and metatarsal tubercle; a cutaneous fold along the tarsus, commencing from the single small metatarsal tubercle; fingers with rudimentary web; toes of moderate length, half-webbed. Disks moderately developed. Olive-coloured, with indistinct symmetrical markings on the back, an interocular cross bar being darkest. A dark streak along the canthus rostralis is continued over the tympanum. Femur with three very indistinct

cross bars above, its anterior and posterior sides being blackish minutely marbled with white. Lower parts whitish.

A single specimen was obtained by Lieut.-Col. Beddome in Ceylon; it is 34 millims. long, the length of the hind leg being 48 millims.

#### HYLA ANNECTENS.

The frog mentioned by Mr. Jerdon as *Polypedates annectens* proves to be a species of *Hyla* closely allied to *H. chinensis*.

#### CALLULA TRIANGULARIS, sp. n.

Closely allied to *C. obscura*.

Back nearly smooth, with some flat tubercles in the middle. Fingers quite free, with the extremities truncated; toes free, of moderate length, not dilated at the ends. Tarsus without fold; metatarsus with two small tubercles. Olive-coloured above, with a large triangular black spot occupying nearly the whole length of the back, commencing from the occiput. Sides of the head and body, legs, and lower parts black, with olive-coloured spots.

Several specimens were obtained by Lieut.-Col. Beddome in Malabar. The largest are only 31 millims. long, the length of the hind limb being 40 millims. and of the free part of the fourth toe 8 millims.

#### CALLULA OLIVACEA, sp. n. (Plate LXIV. fig. B.)

Snout short, not very obtuse. Skin of the back nearly smooth, with scarcely any tubercles. Limbs of moderate length. Fingers long, quite free, with broad, truncated disks. Toes with a rudimentary web only, and not dilated at the ends. Tarsus without fold; metatarsal tubercles two, small. Olive-coloured above, marbled with black; lower parts white.

	millim.
Length of body .....	27
„ third finger .....	4.5
„ hind limb .....	33
„ tarsus .....	6
„ fourth toe .....	10

Two specimens were found by Lieut.-Col. Beddome on the Yella-gerry hills at an altitude of about 2000 feet.

#### PEDOSTIBES, g. n.

Differing from *Callula* in its physiognomy and habit, which resemble that of *Bufo*. Palate concave, without any transverse ridges.

#### PEDOSTIBES TUBERCULOSUS, sp. n. (Plate LXIV. fig. C.)

Body rather narrow and slender; head flat above, with short, pointed snout, distinct canthus rostralis, and perpendicular loreal region. Tongue narrow. Choanæ narrow; Eustachian tubes very narrow. Eye rather large. Tympanum extremely small, but distinct. Legs rather slender. Fingers dilated, distinctly webbed at

the base, with broad, truncated disks: the first very short, the second nearly twice as long, the fourth longer than the second, and the third the longest. A broad metacarpal tubercle. Toes rather short, broadly webbed, with truncated ends. Two small metatarsal tubercles; no tarsal fold. Skin of the upper parts tubercular, the largest tubercles being arranged along each side of the back; the upper surface of the head nearly smooth. Brownish grey, sides darker. A white band from below the eye to the axil; another white longitudinal band in the lumbar region. Lower parts whitish, spotted with black.

	millim.
Length of body . . . . .	35
„ hind limb . . . . .	48
„ tarsus . . . . .	8
„ fourth toe . . . . .	13

Two specimens from Malabar (Lieut.-Col. Beddome).

#### GEGENES (g. n. Cœciliid.).

Allied to *Epicrion*, but with the labial groove advanced to the front margin of the mouth, and very indistinct annular folds of the skin. Eyes not visible.

#### GEGENES CARNOSUS.

*Epicrion carnosum*, Beddome, Madr. Month. Journ. Med. Sc. 1870, p. 176.

Head depressed, of moderate width; body slender, cylindrical; tail extremely short, obtuse. Eyes not visible; mouth narrow, the labial grooves, or rather pores, are on a level with the front teeth, the nostrils close to the extremity of the snout. Upper jaw projecting beyond the lower. The skin of the body forms about 116 folds between the head and end of the tail; they are all indistinct, and quite obsolete on the back, only the hindmost being perfectly annular. Colour uniform brownish olive.

Two specimens, 7 inches long, were obtained by Lieut.-Col. Beddome from Periah Peak, Wynaad, at an altitude of about 5000 feet.

#### EXPLANATION OF PLATES LXIII.-LXVI.

##### PLATE LXIII.

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|--|--|--|
| Fig. A. <i>Ansonia ornata</i> , p. 568.  |  | Fig. C. <i>Ixalus diplostictus</i> , p. 574. |
| B. <i>Polypedates beddomii</i> , p. 571. |  |  |

##### PLATE LXIV.

- |  |  |  |
|--|--|--|
| Fig. A. <i>Bufo hololius</i> , p. 569. |  | Fig. C. <i>Pedostibes tuberculosus</i> , p. 576. |
| B. <i>Callula olivacea</i> , p. 576.   |  |  |

##### PLATE LXV.

- |  |  |   |
|--|--|---|
| Fig. A. <i>Polypedates chloronotus</i> , p. 569. |  | Fig. B. <i>Polypedates formosus</i> , p. 570. |
|  |  |   |

##### PLATE LXVI.

- |  |  |   |
|--|--|---|
| Fig. A. <i>Ixalus montanus</i> , p. 574. |  | Fig. C. <i>Ixalus stictomerus</i> , p. 575. |
| B. — <i>chalahodes</i> , p. 574.         |  |   |

2. List of Birds met with in North-eastern Queensland, chiefly at Rockingham Bay. By E. PIERSON RAMSAY, F.L.S. &c.

[Received August 24, 1875.]

1. *AQUILA AUDAX* \*.

Scarce near the coast, but plentiful over the coast-range on the tablelands.

2. *HIERAËTUS MORPHNOIDES*.

This rare and interesting species is by no means easily obtained; a few specimens have visited the coast-range near the heads of the Herbert river, and on the tablelands. Mr. J. B. White procured several fine specimens of both sexes at Springsure and on the Barkoo river; and it is also found about 100 miles inland from Rockhampton. The sexes differ considerably in size; and individuals of both sexes vary in the colour and intensity of the plumage, some being of a rich dark rufous or rusty brown, others light buff (almost white) on the abdomen, pale rusty brown on sides of chest and flanks, a stripe of blackish brown down centre of each feather; the sexes and individuals of the same sex also differ greatly in size. A small male in the Dobroyde Collection measures:—total length 16·5 inches; bill, from forehead, along the culmen, 1·4, from cere, along culmen, 1·2, from cere to tip 1·1; wing 13, tail 7·8, tarsus 2·3. A female in the Australian Museum, total length 22 inches, wing 15·85, tail 9·8, bill 1·4, culmen 1·7, tarsus 2·8.

3. *POLIOËTUS LEUCOGASTER*.

Plentiful everywhere along the coast. I have noticed them seize Plover and *Porphyrio* as they rose from the swamps.

4. *HALIASTUR LEUCOSTERNUS*.

Very common all along the coast, they venture as far south as the Clarence river, where they are considered rare, and extend northwards to Cape York and coast of New Guinea. Eggs 2 in number, dirty white, sparingly blotched with reddish brown, length 2·1 by 1·65 inch.

5. *HALIASTUR SPHENURUS*.

A species with great range of habitat; it frequently ascends river-districts into the interior, and it is to be found on many of the lakes inland.

6. *PANDION LEUCOCEPHALUS*.

By no means rare, but not often procurable; it ranges as far south as the Clarence river. I have specimens of the eggs of this species taken from a nest of sticks built in a *Eucalyptus* overhanging the Brisbane river; they are 2 in number, 2·5 inches long by 1·65 in breadth, of a dirty white, strongly blotched with deep rust-red spots and markings, with a few blotches of slaty blue—a very handsome egg.

\* Where no references are given, the names are taken from Gould's 'Hand-book.'

7. *FALCO HYPOLEUCUS*.

This exceedingly scarce bird was met with by Inspector Robert Johnstone, Esq., of the Herbert river, on the tablelands due west of Cardwell, and on the ranges thereabouts; J. B. White, Esq., of Springsure, due west inland from Rockhampton, likewise noticed it, and was fortunate enough to obtain several specimens. The young differ slightly from the adults, and, like others of the tribe, are occasionally mottled with brown on leaving the nest.

8. *FALCO LUNULATUS*.

One female, shot on Herbert river, belongs to the large light-coloured variety of this species.

9. *FALCO SUBNIGER*.

I am indebted to J. B. White, Esq., of Springsure, for much information respecting our Australian Falconidae and for a specimen of the present species, procured by that gentleman in the Barkoo district. Mr. R. Johnstone also noticed it on the tablelands inland, about 40 miles from Cardwell, and on the Sea-view range.

10. *LEUCOSPIZA NOVE-HOLLANDIÆ*.

Not a common species; only two or three specimens obtained; they are larger than our New-South-Wales birds, and barred with longitudinal blotches of dull brown on the breast and flanks; the backs of all were brown. Sex uncertain. No purely white birds seen.

11. *ASTUR APPROXIMANS*.

Adults and young obtained. This species seems more plentiful than the *Accipiter*.

12. *ACCIPITER TORQUATUS*.

Several observed on the margins of the scrubs; only one shot (male).

13. *ELANUS AXILLARIS*.

Apparently scarce; only shot one specimen.

14. *MILVUS ISURUS*.

I met with this rare species only on one occasion; there is a fine specimen in the Australian Museum, shot by Mr. Masters on the Burnet river, Queensland.

15. *MILVUS AFFINIS*.

Common everywhere at times, and found chiefly on the open grass-lands in the neighbourhood of the Herbert and Mackay rivers.

16. *BAZA SUBCRISTATA*.

Usually found in pairs about the margins of the scrubs and bushes. It is a harmless, inoffensive species, feeding chiefly on insects and their larvæ, or occasionally on dead animals.



17. *CIRCUS ASSIMILIS*.

Occasionally met with on the open grass-lands of the Herbert river. Mr. White obtained five examples inland from Rockhampton, at Springsure, and on the Barkoo river.

18. *CIRCUS GOULDI*.

Plentiful enough at times; they often assemble in small flocks, and may be seen skimming over the open grass-beds and seizing the Quail and other small birds as they rise. If no Hawks are to be seen, a good method to obtain specimens is to set fire to the grass, when several species will soon arrive, and some may be seen dashing almost into the flames after the birds as they rise.

19. *STRIX TENEBRICOSA*.

Very rare; only one specimen, obtained in the bushes near Dalrymple's Gap.

20. *STRIX NOVÆ-HOLLANDIÆ*.

This species is now plentiful in the bushes of the coast-range. I noticed in Mr. J. B. White's collection, obtained at Springsure, a very dark-faced variety; the facial disk was of a deep chestnut; another shot at Dalrymple's Gap on the coast-range has the disk almost white, and large spots on the under surface. It is a very variable species.

21. *STRIX DELICATULA*.

I examined one specimen shot near the township of Cardwell; it does not appear to differ from the usual New-South-Wales form of this species.

22. *SPILOGLAUX BOOBOOK*.

One specimen, shot by my collector near Cardwell, is slightly larger than the ordinary birds of the same species found in New South Wales. Colouring the same.

23. *HIERACOGLAUX CONNIVENS*.

This species seems to be more plentiful than *Spiloglaux boobook*; neither are they by any means rare.

24. *PODARGUS*, sp.

I have again to observe that two species, quite distinct from one another in the form of the bill as well as in colour, have been procured; these are also distinct from those obtained by my late collector, Spalding, in the same district several years ago. The species of this genus are in such glorious confusion that it is almost impossible to recognize any of them from bare descriptions.

The two I have lately acquired are certainly distinct from any figured in Mr. Gould's work on the Birds of Australia.

25. *PODARGUS PAPUENSIS*.

Very scarce; one specimen is slightly smaller than those I have obtained from Cape York.

26. *PODARGUS PHALÆNOIDES*.

One specimen only procured ; it is looked on as a very rare bird at Cardwell.

27. *PODARGUS MARMORATUS*.

One specimen only shot, at Salt-water Creek, near Cardwell.

28. *EUROSTOPODUS GUTTATUS*.

Plentiful at times ; several specimens were obtained. They fly low over the clearings and grassy flats for about an hour at dusk. Its single egg is laid on the ground without any preparation for it, usually near some stone or stump on the side of a stony ridge ; the ground-colour is of light-greenish, creamy white, sparingly marked all over with dots and oval spots of blackish and slaty brown, a few appearing as if beneath the surface of the shell. Length 1·38 by 1 inch in breadth, both ends nearly equal.

29. *EUROSTOPODUS ALBOGULARIS*.

I shot several of this species on the Mary river, but only obtained one specimen from the Cardwell district. The egg resembles that of *E. guttatus*, without the greenish tinge on the ground-colour, which is of a rich, light cream-colour, spotted sparingly all over with round dots and oval-shaped marks of black, blackish brown, and slaty black, which latter appear beneath the surface of the shell ; length from 1·41 to 1·5 inch, breadth from 1·03 to 1·03, equal at both ends.

I found this species breeding both at Brisbane and on the Mary river. My brother, James Ramsay, Esq., of Nanama, forwarded to me authentic eggs from the Merule in the Riverina district of New South Wales.

I take the present opportunity of correcting a mistake respecting the egg of this species that I described as such in the list of birds from Port Denison (P. Z. S. 1875, p. 113) ; it evidently belonged to the following bird (*Caprimulgus macrurus*). Rainbird, who was not aware of the generic difference between the two birds, sent me a *Eurostopodus* instead of a *Caprimulgus*, the great similarity in the plumage of these two Australian species evidently misled him.

30. *CAPRIMULGUS MACRURUS*.

This species is plentiful near Cardwell ; many specimens were procured. I am indebted to Inspector Robert Johnstone for a fine pair of their eggs ; they were found on the ground on the side of a ridge near the Herbert river, and are of a light rich cream-colour, fading to whitish after being emptied, clouded all over with fleecy markings of pale slaty lilac, which appear beneath the surface of the shell ; length 1·1 by ·81 inch in breadth.

31. *CHETURA CAUDACUTA*.

Met with on the plains inland and flying over the extensive grass beds on the lower Herbert.

32. *CYPSELUS TERRÆ-REGINÆ*, Ramsay, P. Z. S. 1874, p. 601.

I met with this interesting species upon several occasions. Their flight is remarkably swift, and resembles that of the Spine-tailed Swallow (*C. caudacuta*); their actions are also similar. Very difficult to procure.

33. *HIRUNDO FRONTALIS*.

This species seems to visit all parts of Australia; I noticed no difference between the individuals from the Herbert river and those in New South Wales.

34. *LAGENOPLASTES ARIEL*.35. *HYLOCHELIDON NIGRICANS*.

I found both species assembled together in large numbers at Upper Herbert in April; they were evidently preparing for migration.

36. *MEROPS ORNATUS*.

Common everywhere during April in immense numbers, adults and the young of the year evidently preparing for their annual migration.

37. *EURYSTOMUS PACIFICUS*.

Plentiful about the township of Cardwell and elsewhere.

38. *DACELO GIGAS*.

Not so common as the next species; only two or three pairs noticed. Their different note at once distinguishes them even at a great distance.

39. *DACELO LEACHII*.

Plentiful and easily procured when *not* wanted! The furthest south I have noticed this species was about the Mary and Burnet rivers; but I have received specimens said to have been shot at Toowoomba, some distance inland from Brisbane.

40. *TODIRAMPHUS SANCTUS*.

This species was not plentiful; a few specimens shot, but unfortunately in the moult, were slightly smaller than the New-South-Wales birds.

41. *TODIRAMPHUS PYRRHOPYGIUS*.

I give this species on the authority of Inspector R. Johnstone, who observed it about 50 miles inland from the coast; it has a very extensive range of habitat. In December 1869 it visited Dobroyde, near Sydney.

42. *TODIRAMPHUS SORDIDUS*.

This species is by no means rare; but usually inhabits the mangrove-swamps and margins of the rivers near the mouth, where they are not easily obtained.

## 43. CYANALCYON MACLEAYI.

I seldom found this species on the river-banks. Inland it is plentiful, being the most common species. They excavate a hole in a nest of the White Ant (*Termes*), and, enlarging it into a chamber near the end, lay 4 or 5 round glossy white eggs, slightly smaller than those of *Halcyon sanctus*.

## 44. ALCYONE PULCHRA.

This appears to me to be only a northern variety of *Alcyone azurea*. It is common on all the creeks and rivers.

## 45. ALCYONE PUSILLA.

By no means rare, but seldom found away from the creeks in the very densest parts of the scrubs; it is always difficult to procure. Its note is a shrill, weak, piping cry, emitted chiefly while on the wing. Several specimens obtained. There is no difference in the plumage of the sexes.

## 46. TANYSIPTERA SYLVIA.

This lovely bird, I noticed, inhabited the most dense parts of the scrubs; I never saw the birds in any of the open parts; except diving across from one side of a gully to the other, they always keep to the low Palms and are more frequently heard than seen; their note is a shrill cricket-like chirrup.

## 47. GYMNORHINA TIBICEN.

By no means common; I regret I did not shoot some specimens; they appeared much smaller than our New-South-Wales birds, although their flute-like note is identical. Met with in the open forest-country.

## 48. CRACTICUS NIGROGULARIS.

## 49. CRACTICUS TORQUATUS.

I did not observe any difference in these and individuals of the same species from New South Wales.

## 50. CRACTICUS QUOYII.

This handsome species differs in its habits from all the other members of the genus. It frequents the mangrove-swamps and dense bushes about the rivers, where its presence is every now and then betrayed by its loud ringing note, emitted chiefly when on the move. For the most part it resorts to the tops of the trees, and feeds on various insects of several families.

## 51. GRAUCALUS MELANOPS.

Common, frequenting the open country.

## 52. GRAUCALUS MENTALIS.

Usually seen in pairs or small troops of 4 or 5 in number, frequently on margins of scrubs &c. or in the open forest-country.

53. *GRAUCALUS HYPOLEUCUS*.54. *GRAUCALUS SWAINSONI*.

Both species seem plentiful and confined to the scrubs and bushes.

55. *ARTAMUS SORDIDUS*.56. *ARTAMUS LEUCOPYGIALIS*.57. *ARTAMUS CINEREUS*.

All plentiful after the breeding-season ; they move about in troops, sometimes all three species together, sometimes separately and visiting certain localities alternately. The young of *A. cinereus* are striated with whitish on the head and back, like the young of other members of the genus.

58. *ARTAMUS MINOR* (Vieill.).

My collector obtained several of this species from a troop visiting Salt-water Creek, near Cardwell ; they frequented the open parts of the forest-lands and paddocks in the vicinity. I have met with them as far south as the Mary river. There is no difference in the plumage of the sexes.

59. *PARDALOTUS MELANOCEPHALUS*.

Perhaps the most common species. It resorts to the topmost leafy twigs, where it secures its food of insects and their larvæ. The nest is at the end of a long narrow burrow in the side of a bank, where a chamber is hollowed out and lined with narrow strips of bark or grasses for the reception of the eggs, which are 4 in number, snow-white, and a little larger than those of *P. punctatus*.

60. *PARDALOTUS PUNCTATUS*.

This seems a rare species, and was only met with once. *P. affinis* and *P. striatus* were not obtained within 100 miles of Cardwell, and have consequently been omitted from this list ; I have no doubt, however, that they will eventually be found in the Rockingham Bay district.

61. *STREPERA ANAPHONENSIS*.

I met with this easily recognized species upon several occasions in the open forest-country about the head-waters of the Herbert.

62. *CAMPEPHAGA KARU*.63. *CAMPEPHAGA JARDINII*.

Both species commonly found among the leafy boughs of trees on the margins of scrubs.

64. *PACHYCEPHALA RUFIVENTRIS*.65. *PACHYCEPHALA MELANURA*.

I did not find either of these species plentiful, and only obtained one of each.

## 66. COLLURICINCLA PARVULA.

I noticed that individuals of this species are much more highly coloured and deeper in tint than those I obtained from the Richmond and Clarence rivers in New South Wales. It is one of the most common birds on the Herbert river, and has a very pleasing and varied note, imitating and mocking almost every bird it hears. It is lively and graceful in all its actions, the first up in the morning and the last to roost at night; the scrubs resound with its pleasing song. The nest is composed of shreds of bark, grasses, and skeletons of leaves, &c.; it is cup-shaped, similar but smaller than that of *C. harmonica*. The eggs, 4 in number, white, with black and slaty-brown dots and spots.

## 67. OREOICA GUTTURALIS.

Found only in the open forest-land about 25 miles inland.

## 68. CHIBIA BRACTEATA.

A very common species; I frequently observed them taking their food on the wing at dusk. They appear always to be noisy and pugnacious.

## 69. RHIPIDURA ALBISCAPA.

## 70. RHIPIDURA RUFIFRONS.

These species were only met with on one or two occasions in the bushes on the Herbert river; they appear to be rare in these parts.

## 71. RHIPIDURA ISURA.

Not finding any notice of the superciliary stripe in Mr. Gould's description of this bird, I was induced to consider it distinct, and described it under the name of *R. superciliosa* in P. Z. S. 1874, p. 604. Since, however, having had access to the folio edition of Mr. Gould's work, I find they are identical. This species has more of the habits of *Sauloprocta motacilloides*. It frequents the open parts of the forest and margins of the scrubs.

## 72. SAULOPROCTA MOTACILLOIDES.

Common everywhere on the margins of scrubs near dwellings and on the open plain.

## 73. SEISURA INQUIETA.

Not plentiful, met with occasionally.

## 74. PIEZORHYNCHUS NITIDUS.

Plentifully distributed over the whole district; frequents mangroves and thick brushes on the margins of creeks and rivers. A very pleasing and active bird.

## 75. ARSES KAUPII.

On a better acquaintance with this species, I find its habits closely

resemble those of *Rhipidura albiscapa*, especially in spreading its tail, creeping and hopping, with its wings half open, about on the trunks of the trees, often head downwards, searching under leaves and loose bark for insects, or darting out here and there to capture one on the wing. Its actions are lively and pleasing in the extreme; and when close by, the blue ring round the eye is plainly visible and conspicuous. This species is not rare, but seems to frequent the same parts of the dense scrubs throughout the whole season. I noticed several pairs in the Herbert-river brushes, and frequently returned to the same place day after day to watch them and wait for Casuaries; at such times I had ample opportunities of studying the habits and actions of many other species, which would frequently come within a few feet of me, and in more than one instance perched on my hat.

76. *MYIAGRA PLUMBEA*.

I shot a few specimens in the hopes of finding *M. latirostris*, but did not find them differ from the New-South-Wales specimens.

77. *MYIAGRA NITIDA*.

Like the preceding species, I found this bird plentiful in the dense brushes and scrubs on the Herbert river and other parts of the district.

78. *MACHÆRIRHYNCHUS FLAVIVENTER*.

I was delighted to find this pretty species, and secured some fine skins just in time, as they had just finished breeding, and in a few days afterwards I found them moulting, January 1874.

79. *MICRÆCA FASCINANS*?

On one occasion only I met with a bird which I believe to be of this species; having more important birds in view, did not secure any specimens.

80. *MICRÆCA FLAVIGASTER*.

This bird is not plentiful, and was only found after several weeks' diligent search. Inhabits the tops of the trees in the open grass-lands. I never heard it singing as its representative *M. fascinans* is wont to do in New South Wales; and only on one occasion did I find them near any of the settlers' residences. They moulted earlier than any other birds in the district, being found in full new plumage on April 28, 1874.

81. *MONARCHA CARINATA*.

Common in dense scrubs. It builds a neat nest among upright twigs, round, open above, composed of grasses and fine shreds of bark, the outside completely covered with bright green moss (*Hypnum dendroides* &c.). The eggs, two or three in number, are white, thickly sprinkled with light reddish chestnut or reddish brown spots and dots.

82. *MONARCHA TRIVIRGATA*.

One of the most common scrub birds. Its actions are more animated than those of *M. carinata*; it constructs the same kind of nests, in similar places, and of the same materials; also lays eggs two or three in number, of the same colour and markings, only differing a little in size.

83. *GERYGONE ALBOGULARIS*.

This species just arrived in time, before I left the Herbert, to be entered in the list; their arrival was announced by their pretty, melodious song, about the end of April. They arrive to breed with us in New South Wales in September or late in August. If I remember right, their nest and eggs I have fully described previously,

84. *GERYGONE CULICIVORA*?

This is either *G. culicivora* or a new species. It is found common among the dense belts of mangroves near Cardwell; we found several of its nests containing eggs and young birds on Feb. 26, when my young friend Master I. Sheridan, an enthusiastic young naturalist, kindly waded nearly up to his thighs in black mud to secure them for me; one nest contained the eggs of a Cuckoo, exactly the same as that of *Chrysococcyx plagosus*, but smaller than any eggs of that bird I have hitherto met with; it is probably the egg of *C. minutillus*. The nest is a somewhat bulky structure, and resembles closely a lump of debris left by the floods hanging to the end of some leafy twig, it is composed of shreds of bark, dried water-weeds, and withered grasses, selected, I have no doubt, from the debris of the floods, plentiful on every side. It is oval oblong, with a small side entrance, and suspended by the top to the end of some hanging branch, often a considerable distance from the shore. The eggs are white, with a few dots of brown at the larger end; some altogether white, without any markings.

85. *GERYGONE*, sp. inc.

One of the most common species, always to be found in the dense scrubs by its pleasing twittering note. The birds were in full moult when shot. A *very indistinct* dark bar across tip of the tail, otherwise like *G. albugularis*.

86. *ERYTHRODRYAS ROSEA*.

One pair noticed on the margin of a dense scrub; although frequently watched for hours, no nest was discovered.

87. *PETROICA MULTICOLOR*.88. *MELANODRYAS CUCULLATA*.

Both species appear to be residents; they are not plentiful, but met with on several occasions in the open forest-lands, and near the homesteads of the settlers.



89. *PÆCILODRYAS SUPERCILIOSA*.

Found frequenting the outskirts of scrubs and thinly wooded banks of the rivers.

90. *PÆCILODRYAS? CINEREIFRONS*, sp. nov.

Head dark ashy grey, slightly tinged with olive on the crown; a broad ashy-grey band extends from over the eye to the back of the head; lores and chin blackish brown; throat and a short broad line extending just under the eye white; ear-coverts, nape, interscapular region, mantle, and rump olive-brown; the upper tail-coverts and tail olive, washed with rufous; inner webs of the tail-feathers dark ashy brown, the outer three feathers on either side margined with a well-defined line of white at the tips; under surface of the tail dark ashy brown; under tail-coverts and flanks rich buff; abdomen white; breast and chest ashy grey, becoming white on the throat; sides tinged with olive-brown; under surface of the wings dark ashy brown, having a white band crossing the wing near the base of the primaries and secondaries; under wing-coverts dark ashy brown, a spot of white at the base of the spurious wing; under surface of the shoulder white, the upper surface of the shoulder ashy grey; the wing-coverts above and the concealed portions of primaries and secondaries blackish brown; the scapulars and terminal half of the outer web of primaries and secondaries olive; the basal portion blackish brown, having a broad white band extending through them across the wing, just in front of the greater wing-coverts, and being broader on the secondaries nearest the body, but not extending on to the scapulars. Bill black at the base, white at the tip and along the under margin of lower mandible; legs, feet, and nails flesh-colour.

Total length 5·7 inches; bill from forehead ·8, from nostril ·45, from angle of the mouth ·9, height at the nostrils ·25, width ·2; wing 3·9 inches; tail 2·9; tarsus 1·2; hind toe ·5, its claw ·3; middle toe ·65, its claw ·25; outer toe ·55, its claw ·2; inner toe ·45, its claw ·2.

*Hab.* Brushes of the coast range near Cardwell, Rockingham Bay.

*Remarks.*—In habits and actions this species closely resembles the *Eopsaltriæ*, and like them may be seen perching frequently on the side of the upright stems of the trees.

91. *EOPSALTRIA CAPITO*.

Plentiful in the dense parts of the brushes. Their habits resemble *E. australis* of New South Wales.

92. *EOPSALTRIA INORNATA*, Ramsay, P. Z. S. 1874, p. 604.

In habits it resembles the preceding, but is either very rare or easily overlooked. It has been found in the scrubs on the Endeavour river.

93. *PSOPHODES CREPITANS*.

The specimens shot of this species were a trifle smaller than those from New South Wales. The nest is a rather bulky structure, com-

posed of rootlets, and skeletons of leaves and ferns, &c., lined with finer material, and sometimes, I am told, with feathers; it is not unlike a very large-sized nest of *Sericornis frontalis*, or a bulky nest of *Malurus cyaneus*, it is dome-shaped, with a comparatively large opening in the side, and placed in low bushes surrounded by vines &c. The eggs are three to four in number, of a greenish-white colour, with blackish, irregular, linear-shaped markings, some twisted and looped; a few on the larger end, where they are most numerous, are of a slaty blue, and appear beneath the surface of the shell; on the thicker end of some, hair-lines of black predominate, and, crossing and looping over one another, form here and there a black blotch. Length 1.1 to 1.2 inch, by 0.8 to 0.85.

94. *MALURUS CYANEUS*.

I met with this species at Port Dennison, but not further north if I remember rightly.

95. *MALURUS AMABILIS*.

96. *MALURUS HYPOLEUCUS*, Gould, Suppl. B. A. pl. 22.

These birds, whether they be of the same species or not, were found together on the open grass-lands in the neighbourhood of Cardwell, in the vicinity of scrubs. It has not by any means been proved that they are male and female of the same species, as I find *neither Cockerell nor Thorpe*, during their trip at Cape York, ascertained the sexes of the birds they shot, *by dissection*: I have made particular inquiries of Mr. Thorpe on this point; and I regret to say my collector at Rockingham Bay, when he skinned my specimens, made the same mistake, and went solely by the plumage; in the same locality were shot specimens of *M. lamberti*. It is not improbable that Mr. Gould's *Malurus hypoleucus* is quite a distinct species, or perhaps the young male of *M. amabilis*; but from the shape of the bill &c. I am at present inclined to believe it to be a distinct species; the fact that they associate together in troops proves nothing on this point.

97. *MALURUS LAMBERTI*.

I think Rockingham Bay must be the most northern limit of this species. The New South Wales birds differ in the tint of colouring from those from South Australia, being of a more verditer blue on the head, and of a lighter tint on the back.

98. *MALURUS MELANOCEPHALUS*.

Common everywhere from the Clarence river in New South Wales to Cape York.

99. *CISTICOLA RUFICEPS*.

This species is plentifully dispersed over the grass beds; it is common near Sydney, and equally plentiful at Cape York. The nest is a very neat, dome-shaped structure, chiefly composed of fine grasses, thistle-down, and cobweb, or the flowering portions of

grasses all matted closely and thickly together, and having the adjacent leaves of the plant in which it is placed neatly sewed on to the side of the nest; sometimes two or three broad leaves are sewed together with cobweb, and the nest made between them. The eggs are about the size of those of *Sericornis brevirostris*, of a delicate blue, spotted rather largely with reddish brown; they are three in number. The nest is always placed near the ground where the grass growing through some broad-leaved plant affords it concealment.

100. SERICORNIS CITREOGULARIS.

101. SERICORNIS MAGNIROSTRIS.

Both species plentiful in the dense scrubs; their large pendent nests hang like masses of moss-grown debris from almost every tree in certain parts.

102. GEOBASILEUS CHRYSORRHOUS.

I met with this species about 50 miles inland from Cardwell. There were also several *Acanthizæ* twittering in the scrub close by; but I had no opportunity of determining the species.

103. ANTHUS AUSTRALIS.

Always abundant in similar situations to those it frequents in New South Wales.

104. SPHENGEACUS GALACTOTES.

This species is one of the most common grass-birds; universally dispersed ever the whole of Queensland.

105. CALAMOHERPE AUSTRALIS.

Found only on one occasion in tall reeds while we were shooting wild Geese (*Anseranas melanoleucus*); the note being exactly the same as that of the New-South-Wales bird, I presume it was the same species. Did not shoot any specimens.

105\*. MIRAFRA HORSFIELDII.

I found this species frequenting the dry parts of the grass beds all over the district of the Herbert river.

106. ÆGINTHA TEMPORALIS.

This species appears to be very rare about Cardwell. I met with only one small troop at Dalrymple's Gap, on the road to the Lower Herbert river.

107. NEOCHMIA PHAËTON.

The most common species from Rockhampton north to Cardwell.

108. DONACOLA CASTANEOTHORAX.

This and the preceding two species are the only ones I met with near

Cardwell. *Poephila gouldiae* was described to me very correctly, and said to have been met with on the tablelands about 30 miles from Waterview; I did not find any specimens myself.

109. *PITTA STREPITANS*, var. *SIMILLIMA*.

This northern variety of *Pitta strepitans* I found common enough at the Herbert river and scrubs around Cardwell. Some of the specimens are deeper-coloured and smaller even than any I have seen from Cape York; others, again, are not to be distinguished from the New-South-Wales birds; the white spot on the wing is almost obsolete in many from the ranges near Cardwell. Their notes are exactly the same in all localities. The nest and eggs are the same, and are found to vary in the same way as those described and figured by me in 'The Ibis,' 1867, p. 417. In size they are slightly smaller. I believe the finely spotted variety of the eggs of this species, taken at Cape York by Cockerell and Thorpe, was at the time mistaken for the eggs of *Pitta mackloti*—which is very probable. One thing is certain, I never knew a nest of either *Pitta strepitans* or *P. simillima* to contain more than *three eggs alike*; and most often two out of the four (*the number invariably laid for a sitting*) have been of the finely spotted and light-coloured variety, the other two strongly and deeply marked, as figured in 'The Ibis,' 1867, p. 417.

110. *OREOCINCLA LUNULATA*.

I only once met with this species, in the scrubs on rocky sides of the coast-range; the eggs elongate, greenish, spotted with reddish brown, four in number.

111. *ÆLURÆDUS MACULOSUS*, Ramsay, P. Z. S. 1874, p. 601.

This interesting species appears to take the place of the *Æ. smithii* of New South Wales. We found it feeding on the fruit of the native figs, in small families of four to eight in number. The note is more of a *whistle* than a *cry* of any kind.

112. *SCENOPEUS DENTIROSTRIS*, gen. et sp. nov.

The whole of the upper surface, wings, and tail rich olive-brown, the inner webs of the primaries and secondaries blackish brown, their margins near the base buffy white; under surface of the shoulders yellowish buff, with remains of broken bars of blackish brown on the smaller feathers; the under wing-coverts yellowish buff, with cross bars of dull brown; under primary-coverts buff, crossed more distinctly with dull brown; under surface of primaries and secondaries dark ashy brown, the basal half of the inner margin buff tinged with a faint wash of light rufous, flanks olive-buff; abdomen buff; under tail-coverts olive-buff, each feather barred with two or more lanceolate marks of dull olive-brown, under surface of the tail dull brown; throat, neck below, chest, and the rest of the under surface buffy white, each feather margined with olive-brown, which becomes lighter and less distinct on the lower parts, and almost obsolete on the flanks.

and abdomen; on the throat and chest the margins are almost black, and tinged with yellowish olive on the sides of the neck and chest, and the buff central portion of a deeper tint; the under surface has the appearance of being broadly streaked with lanceolate marks of buff, which become more and more indistinct as they approach the under tail-coverts, becoming obsolete on the abdomen.

Total length 11 inches; wing 5·7; tail 4; tibia 2·2; tarsus 1·2; hind toe 0·6, its claw 0·4, its width 0·25; inner toe 0·65, its claw 0·3; middle toe 0·9, its claw 0·35; outer toe 0·7, its claw 0·3; width of the sole of the foot 0·35; bill from gape 1·2, from forehead 1·1, from the nostril 0·6, height at nostril 0·6, width at nostril 0·5, culmen 1·1; upper mandible black, lighter at the tip; lower mandible blackish brown; gape yellow; legs and feet black, claws brown.

*Note*.—The cheeks and sides of the face and the ear-coverts have a rufous tinge, which may be from blood-stains; the greater portion of the breast and abdomen having been shot away, it is almost impossible to describe these parts accurately. The only specimens procured were shot by Inspector Johnstone, of Cardwell, with his rifle, and were consequently much damaged.

*Hab.* Bellenden-Ker range and the dense brushes clothing the steep sides of "Sea-view range" on the north-east coast of Queensland.

This species is not as yet known to build a bower; but like the Catbirds it clears a large space under the brushwood some 9 or 10 feet in diameter, and ornaments the cleared part with tufts and little heaps of gaily tinted leaves and young shoots.

This bird, which cannot be placed in any of the known genera of the family of Bower-birds, nevertheless approaches *Aluradus*; it differs, however, from that genus in the following particulars:—The head itself is more elongated, the forehead flattish, broad, sloping very gradually from the bill, which is short and thick, much swollen at the sides; culmen much curved to the tip, which is blunt and strongly toothed; the inner margin also is toothed, having three distinct indentations (*hidden by the outer margin*) for the teeth of the lower mandible to fit into; lower mandible with one terminal and two lateral teeth on the margin on either side; nostrils basal, sunk, large, circular; the culmen just over these is compressed laterally; they are not hidden, although the bill is thickly clothed with feathers at the base; a few black short bristles over the nostrils; bill, measuring from its extreme base on the forehead, nearly the full length of the head; wings moderate, quills elongate, narrow, all more or less rounded; the secondaries squarish at the tips, being of a nearly equal breadth throughout; tail short, square, of twelve feathers, nearly all equal in length, the under coverts reaching to about the middle of the tail; tarsi short, about half the length of the tibia\*; feet comparatively small, hind toe connected to inner toe at the base by interdigital membrane, its sole broad; outer toe connected to middle toe as far as first joint, toes short; outer and inner

\* One tenth of an inch longer than *half* the tibia.

about equal in length, middle toe about one third longer; hind toe shortest and broadest at base; claws of all weak, curved, and compressed laterally. The plumage resembles that of the Catbird *Aeluroedus*, being loose and comparatively long.

113. *MIMETA AFFINIS*.

114. *MIMETA VIRIDIS*.

115. *MIMETA FLAVOCINCTA*.

The first of these species is the most common; the two others I did not find to be plentiful.

116. *SPHECOTHERES MAXILLARIS*.

Plentiful everywhere on the margins of the scrubs.

117. *SPHECOTHERES FLAVIVENTRIS*.

I noticed several in a collection of birds made in the district, but did not perceive any specimens myself at Cardwell.

118. *CORCORAX MELANORHAMPHUS*.

Met with once or twice inland in open forest country.

119. *CORVUS AUSTRALIS*.

Common about the slaughtering-yards throughout the district.

120. *CALORNIS METALLICA*.

One of the most common birds in the scrubs of the Herbert river. They breed in companies, seemingly all through the year, making large bulky nests of grass and fine twigs with a side opening, which hang from the ends of the leafy boughs in clusters or singly; at times the branches break off with the weight of the nests and their contents. On the Herbert I noticed they gave preference to a small-leaved species of fig resembling *Ficus syringifolia*; and before a colony began to build, the twigs on many of the branches were broken and began to wither, and, hanging down, at a distance resembled in colour the brown nests of this species. I noticed this on two occasions, and remarked to Inspector Johnstone that the birds were building near his camp. However, when examining the tree through our field-glasses, we found nothing but bunches of dry leaves swinging about with the wind. A few days afterwards we noticed a neighbouring fig-tree in a similar condition; and as both trees were resorted to by these birds, I was under the impression that it was caused by the ravages of some insect which the birds came to feed on; however, about a month afterwards, Mr. Johnstone informed me that these trees had been taken possession of by colonies of Weaverbirds (or "Starlings," as they are called in those parts); and this bulk of brown nests was forming quite a new feature in the landscape.

The surface of the ground under a tree which has been colonized for some time is perfectly green with thousands of seedling plants,

which have sprung from the fruits brought by these birds for their young.

The food of this species is chiefly, if not exclusively, fruit of various kinds, including the seeds of several species of palms, particularly those of *Ptychosperma alexandrae* and *Kentia wendlandiana*; but although four species of *Calamus* with edible subacid fruits abound, I never found that these birds fed upon them.

The eggs are from three to four in number, variable in form, some roundish, others elongate, about the size of those of *Sturnus vulgaris*, of a greenish white, with bright reddish brown spots and dots, more numerous at the larger end.

121. POMATOSTOMUS SUPERCILIOSUS.

122. POMATOSTOMUS TEMPORALIS.

I only met with these birds on the western side of the coast-range, in open forest and thinly timbered country.

123. GLYCIPHILA FASCIATA.

This species is plentifully distributed over the coast-country from Port Denison to Cooktown. In habits and actions they resemble *Ptilotis flava* and others.

124. GLYCIPHILA SUBFASCIATA, Ramsay, P. Z. S. 1868, p. 385.

This species, although possessing nothing in its sombre plumage to recommend it, is certainly very interesting on account of its peculiarly shaped nest, being the only one of the Australian Meliphaginae that I have met with which constructs a dome-shaped nest. It is a neat structure, composed of strips of bark, spiders' webs, and grass, and lined with fine grasses &c. The opening at the side is rather large; but the nest itself is rather deep, being about 4 inches long and  $2\frac{1}{2}$  to 3 inches wide. The eggs I did not obtain; but one taken from the oviduct of a bird is 0.75 inch in length and 0.5 in breadth, pure white, with a few dots of black sprinkled over the larger end.

The nests were invariably placed among the drooping branches of a species of *Acacia* always overhanging some creek or running water. All the nests I found were so situated; and my young friend Master I. Sheridan of Cardwell, who has paid considerable attention to objects of natural history, assures me that he has never found them otherwise; and the usual number of eggs for a sitting are two, and frequently without any black dots on the surface.

Their note is a sharp, shrill, monotonous cry, oft repeated at intervals; iris reddish brown.

125. STIGMATOPS SUBOCULARIS.

This species seems plentiful, inhabiting the mangroves and margins of the scrubs on the water's edge. They betake themselves to almost any of the forest trees when they are in bloom, attracted by

the honey and insects. In the neighbourhood of Sydney they frequent the orange-groves, and occasionally breed among the branches during the months of October and November. Their cry is peculiar, but not unpleasant, and at times varied.

126. *PTILOTIUS LEWINII*.

This species is universally dispersed over the whole of the coast-country from the Hunter river to Cooktown. It is particularly fond of extracting honey from the flowers of the plantains and native bananas (*Musa banksii*, Müller). Banana groves abound in the Cardwell district, and may be distinguished at a great distance in large patches clothing the sides of the mountains on the sea-coast; and here this species is one of the most common birds. The nest is like that of *P. chrysops*, cup-shaped, open at the top, slung by the sides or rim between the twigs of some leafy bough or vine; it is composed of shreds of bark and grasses, webs of spiders, &c., and lined with similar material of a finer texture, or occasionally, when found in the neighbourhood of dwellings, with feathers, wool, or other soft substances. The eggs are two in number, pearly white, with deep-reddish dots.

127. *PTILOTIUS VERSICOLOR*.

I only met with one specimen of this bird, which I obtained from Broadbent, who informed me the species was not scarce and usually fed among the blossoms of tall *Eucalypti*.

128. *PTILOTIUS MACLEAYANA*, Ramsay, P. L. S. of N. S. W. pt. i. p. 10 (1875).

This fine species is one I mentioned in the P. Z. S. 1868, p. 386, under the name of *Ptilotis versicolor* of Gould (Handb. B. Austr. i. p. 506); and, strange to say, even the fully adult birds show that peculiarity in the plumage which is usually characteristic of immaturity. At first I considered them all young *P. versicolor*; but after having obtained and examined, from several sources, extending over a period of six years, numerous fine specimens, all in similar plumage, and shot at various times through the year, I felt convinced that they belonged to a distinct species; and on comparing them with Mr. Gould's excellent plates, I have no doubt I am correct.

The species has not a very extensive range, being confined, as far as we yet know, to the coast-range from the Herbert river north to Cooktown on the Endeavour. I found them nowhere plentiful, and always of a shy and retiring disposition. The sexes are alike in plumage.

The only note I heard them utter is a simple feeble cry resembling that of *P. chrysops*, but not so loud; in their actions and retiring disposition they resemble more *P. lewinii*.

129. *PTILOTIUS FASCIOGULARIS*.

I find no mention in my note-book of meeting with this bird at Rockingham Bay; but I found it plentiful on an island off Port



Denison and near Cleveland Bay, about 60 miles due south of Rockingham Bay. They frequent the mangroves, and are to be met with in considerable numbers on many of the islands and mangrove-swamps along the shores of various bays as far south as Moreton Bay. They congregate in considerable numbers, and are very pugnacious at times, fighting among themselves and chattering as the yellow-tufted Honey-eaters (*P. auricomis*) are wont to do. I never met with them away from the margins of the salt water.

130. *PTILOTIS FRENATA*, Ramsay, P. Z. S. 1874, p. 603.

A very distinct and interesting species, procured near the township of Cardwell, feeding among the blossoms of the *Eucalypti*. It appears to be very scarce, only three being observed during our stay of six months.

131. *PTILOTIS FLAVA*.

A very beautiful species, and perhaps the most common bird about Cardwell; frequently seen clinging to the flowers of the bananas and plantains in cultivation round the houses: when among the blossoms of the *Acaciæ* they are scarcely discernible, so closely does their yellow plumage match the tint of the blossoms.

132. *PTILOTIS PENICILLATA*.

133. *PTILOTIS FUSCA*.

I found these species frequenting the margins of creeks and rivers on the Upper Herbert, and about 50 miles inland from the coast. I did not notice them near the Bay.

134. *PTILOTIS CHRYSOPS*.

Common everywhere along the coast.

135. *PTILOTIS FILIGERA*.

This seems to be a scarce species and very local, although dispersed over a wide area. I obtained one only at Rockingham Bay; and one I received from Cape York.

136. *PLECTORHYNCHA LANCEOLATA*.

Although I was not fortunate enough to meet with this fine species myself, I saw some fine specimens which had been procured some 60 miles inland. This species appears to confine itself to the west of the coast-range, and is met with occasionally about the heads of the Burnett river.

137. *MELIPHAGA PHRYGIA*.

Once found in open forest-country near heads of the Upper Herbert river, 50 miles inland.

138. *TROPIDORHYNCHUS CORNICULATUS*.

Universally dispersed over the whole country as far north as Cardwell.

139. *TROPIDORHYNCHUS CITREOGULARIS*.

Equally plentiful with the last mentioned, but confined to the more inland parts and open forest-country. The nest is smaller, but similar in form and shape, and placed in like situations to that chosen by *T. corniculatus*; and like that species it builds its nest of strips of bark, and lines it with grass and finer shreds of bark. It is usually suspended by the brim from a horizontal bough, and frequently overhanging the water. An egg given to me some time ago, and said to belong to this species, is creamy white with blackish dots, in form somewhat elongated.

140. *MYZOMELA SANGUINOLENTA*.

During the months of April and May 1874 this bird was found by no means rare, feeding among the blossoms of *Lophostemon*, *Melaleuca*, and *Eucalyptus* in the neighbourhood of Cardwell and on the Herbert river. They arrive about Sydney during the months of October and November, and, remaining, breed during November, December, and as late as January.

141. *MYZOMELA PECTORALIS*?

One specimen only obtained, which I believe to be the young of this species: should it prove otherwise, it will be hereafter described.

142. *MYZOMELA OBSCURA*.

A very common species about Port Mackay and Port Denison, but did not appear to be so numerous about Cardwell; several specimens obtained. I have seen it as far south as the Mary river, where, however, it is very rare.

143. *ENTOMYZA CYANOTIS*?

While in the open forest-country near the heads of the Herbert river I met with species of *Entomyza* on several occasions, but regret we did not shoot any, having nothing smaller than a revolver in the shape of firearms with us. I am not by any means sure that the species was *E. cyanotis*, and am more inclined to consider it *E. albipennis*.

144. *MELITHREPTUS ALBOGULARIS*.

Common all along the coast-line, and for a considerable distance inland, from Brisbane to Cooktown.

145. *MELITHREPTUS GULARIS*.

This species appears to be plentiful, but not in the immediate vicinity of the coast. It is not rare about Maryborough, and is also found on the Upper Herbert. It has considerable powers of song, which may be heard often at daylight in the morning.

While camped on the banks of the Gregory a pair of these birds frequented a Wattle-tree (*Acacia*) near to our "tent" (a sheet of bark!), and delighted us every morning for many days by pouring

out their varied and pleasing song, which often lasted for ten or fifteen minutes without ceasing. I have since heard their song under more comfortable circumstances; and my brother and I at once recognized our old friends.

The nest and eggs are similar but slightly larger than those of *M. lunulatus*; eggs two in number, pale salmon-pink with deep reddish salmon dots on the larger end; the nest is cup-shaped, slung by the rim between twigs at the end of a leafy bough, and composed of fine grasses and strips of bark webbed together with spider's nests.

#### 146. DICAËUM HIRUNDINACEUM.

This species seems dispersed over the whole of Australia; nevertheless it is a bird seldom met with in collections, which may be accounted for by its habit of resorting to the highest trees. I found that both in Queensland and New South Wales they frequent the large clumps of mistletoe and *Loranthus*, of the fruit of which they seem to be particularly fond; at times they enter the gardens and feed on the fruits of the Cape-mulberry (*Morus*, sp.). An *Ehretia hottentotica* at Dobroyde, when its berries are ripe, is a favourite place of resort for this species.

#### 147. NECTARINIA AUSTRALIS.

I only met with this interesting species on one occasion near Cardwell; it is by no means common in that district.

#### 148. ZOSTEROPS CÆRULESCENS.

The Queensland specimens of this species are frequently smaller than our New-South-Wales birds, and often of a brighter tint on the head and throat, the silver ring round the eye is comparatively larger and more conspicuous.

#### 149. PTILORHIS PARADISEA.

The most northerly point that I met with this species was at Port Mackay on the Pioneer river; it was considered there a very rare bird. I have heard of its being occasionally met with in the ranges near Gympie.

This bird is very similar to *Climacteris* in its actions. While encamped for some three or four months in the ranges of the North Richmond river, the great stronghold of this species, I had abundant opportunities of studying its habits, and was struck with the similarity of its actions to our Tree-creepers. The young males and females, seldom accompanied by more than one adult male in livery, are frequently met with together traversing the stems and thick branches of the trees, especially those showing signs or in a state of decay.

The call-note of the adult male is a shrill scream, easily imitated sufficiently to attract its attention and cause it to remain until you approach. By this means I have frequently watched it closely as it hopped round the bole of some decaying tree, or tore off the loose bark in search of insects.

Seldom more than one adult male is found to every quarter of a square mile of scrub; and so little do they wander about, that it was customary for me to return to the same locality day after day until I had shot the bird, being quite sure of hearing him calling if he had not been destroyed in the mean time. These old males are usually solitary; but two or more occasionally meet in some favourite feeding-tree, when a fight is sure to ensue; for, although closely resembling the *Olimacteris* in their actions, they differ in this respect, that they may occasionally be found feeding on the fruit of the native tamarind (*Tamarindus australis*).

The natives informed me that the Rifle-bird lays its eggs, which are white, in the hollow branch of a tree without making any nest whatever—which is not improbable.

150. PTILORHIS VICTORIÆ.

The great stronghold of this species is the Bernard Islands north-east of Cardwell, a short distance from the coast. It is at times found on Hinchinbrook Islands, seldom on Gould and Dunk Islands, but not unfrequently in the dense scrubs clothing the coast-range near Cardwell. Once only did I meet with it on the Herbert river.

Their note and habits closely resemble those of *P. paradisea*. They were in full moult during the time of my visit, February and March, and did not regain their livery until May.

151. CLIMACTERIS SCANDENS.

Not scarce in the open forest-land on the banks of the Upper Herbert river.

152. CLIMACTERIS LEUCOPHÆA.

Met with on one or two occasions on the margins of scrubs on the Herbert river &c.

153. ORTHONYX SPALDINGI, Ramsay, P. Z. S. 1868, p. 386.

In habits and actions this fine species closely assimilates to *O. spinicauda*, but is far more retiring and shy, much more noisy, and may be heard more frequently than seen. The young attains the adult plumage after the first moult, which takes place about December. They breed in September and October; and I believe the young then hatched moult in February and March, judging from a very fine series of skins I then procured.

This species has the habit of scratching up the dead leaves, and throwing the débris far behind it, after the manner of the "Scrub-hens" (*Megapodius tumulus*). Its powers of mimicry are very great; and, like the Lyre-birds, it seems capable of imitating almost any sound. These birds are not only rare, but at all times very difficult to obtain, and appear to be confined to the thickly timbered scrubs on the steep and rugged sides of the coast-range near Cardwell.

154. SITTELLA STRIATA, Gould, Suppl. B. Aust. pl. 54.

I mentioned this species as the young of *S. leucoptera* in P. Z. S.

1868, p. 387, where a mistake in the description occurs, the words *upper surface* should have been *under surface*, as the text will show. It is plentifully distributed over the whole Rockingham-Bay district, and regarded by the aborigines there as sacred and as having had something to do with their first coming to that part of the country. This species seems to be more active than other *Sittella* I have met with. They are usually found in small troops, and seem in a hurry, hopping quickly over the trunks, stems, and branches of the trees, oftentimes head downwards, creeping round and round the limbs, stopping only to disengage some insect from the bark; and calling to each other in a mournful monotonous cry, they fly off to repeat the same actions on some other tree. They move along the forest at no mean pace, usually going in a direct line. The nest, like that of *S. chrysoptera*, is placed in an upright and usually dead fork of some high branch; it is made of fine strips of bark with a large quantity of spider's webs, with which small scales of bark resembling that of the branch in which it is placed are felted on so carefully as hardly to be detected even at a comparatively short distance; the rim is very thin, the nest open above and very deep.

155. *SITTELLA LEUCOCEPHALA*.

This very conspicuous species is far from being rare, and is usually met with in open forest country over the whole of northern Queensland as far as Cooktown. Its habits and actions and nidification do not differ materially from those of the other members of the genus. The notes of all closely resemble each other.

156. *CUCULUS CANOROIDES*.

This species was not rare at Cardwell during the months of March to May. I shot several of them in the moult and young plumage. They do not appear to me to differ much from the European *C. canorus*, either in the adult or in *any of the rufous-tinted immature stages of plumage*. I never heard them call. The young have a decidedly strong rufous tint pervading the upper surface.

157. *CACOMANTIS FLABELLIFORMIS*.

158. *CUCULUS*, sp. inc.\*

Both species common from September to May; the latter I find identical with a bird received from India.

159. *LAMPROCOCYX FLAGOSUS*.

160. *LAMPROCOCYX MINUTILLUS*.

Of the former, two specimens only were obtained, it does not appear to be very plentiful; of the latter species only one specimen was shot, near Cardwell. I obtained from the nest of a species of *Gerygone* an egg resembling that of *L. plagosus*, but much smaller, which, it is very probable, is that of *L. minutillus*.

\* I can find no description of this bird in any work.

161. *SCYTHROPS NOVÆ-HOLLANDÆ*.162. *EUDYNAMIS FLINDERSI*.163. *CENTROPUS PHASIANUS*.

These species are all common enough throughout the whole district, the *Scythrops* usually met with flying about the tops of high trees in companies of five to eight in number; they have a loud harsh guttural croak, which is most usually heard early in the morning. The *Eudynamis* frequents fruit-bearing trees of every description, and feeds on numerous species of berries found in the scrubs, occasionally visiting gardens in the neighbourhood of the settlements for a like purpose. The Swamp-Pheasant, or Cookoo, as it is usually called (*Centropus phasianus*), is very numerous and may be always found frequenting the extensive grass-beds throughout the Colony. These birds prey on mice and small animals, holding them with their feet, and tearing them to pieces if they are too large. I once had a pair of *Centropus* in confinement; and although scarcely nine months old, they readily killed mice or young rats when let go in their cage: first picking them up quickly in their bill and rapping them smartly against the sides of the cage, they soon killed them; but often a peck on the back with their strong bills killed or disabled the animal at once. They eat raw meat, grasshoppers (*Locusta*), lizards, frogs, or bread readily; they appeared to be omnivorous, and became very tame in a short time.

164. *CACATUA GALERITA*.

This bird seems universally dispersed over the whole of Australia; and they are not one whit the less mischievous in the Cardwell district than any other. I found that they frequent the palm trees when the seeds are ripening; and there perched on the fruiting stems they amused themselves biting off the strings of red or green berries, and watching them as they fell to the ground. I have noticed them in New South Wales treating some of the flowering *Eucalypti* in the same way, and have frequently seen large trees with scarcely a bough untouched, and the whole ground underneath strewn with the leaves and branches. They seldom eat either the blossoms or the capsules of the *Eucalypti*, although they do feed on the palm- (*Ptychosperma alexandræ*) berries, and afterwards begin their work of destruction.

165. *CALYPTORHYNCHUS BANKSII*.

Not plentiful, one troop of five only met with on the Herbert river.

166. *CALYPTORHYNCHUS LEACHII*.167. *CALYPTORHYNCHUS FUNEREUS*.

These seem to be the usual, but not common, species found about the Herbert river and Cardwell. I met them on two or three occasions, but found them very shy.

## 168. PTISTES ERYTHROPTERUS.

I found this species dispersed over the whole region from the Clarence river to the Cardwell district. Specimens of this species are smaller in size the further north they are found, until it reaches Cooktown and the Cape-York district, where they are the smallest, and the crimson on the shoulders of a deeper tint.

## 169. PLATYCERCUS CYANOGENYS.

Only once met with; this species appears to be very rare in the Cardwell district, although I have seen several specimens from Cape York.

I found Parrots of all kinds very scarce, and especially the ground-Parrakeets and their allies. I did not meet with a single species of *Euphema* or *Psephotus*.

## 170. TRICHOGLOSSUS MULTICOLOR.

## 171. GLOSSOPSITTA PUSILLA.

## 172. GLOSSOPSITTA AUSTRALIS.

All three species very plentiful, and frequently met with feeding in the flowering *Eucalypti*.

I searched diligently for *T. rubritorquis*, but found no trace of it.

## 173. CYCLOPSITTA MACLEAYANA, Ramsay, Sydney Morning Herald Newspaper, Nov. 15, 1874.

This interesting and prettily marked species was discovered first by Mr. K. Broadbent near Cardwell, and found feeding on the native figs with which the scrubs abound. The specimens in the Dobroyde Collection are the only fully adult specimens obtained. I believe I forwarded to the Society a full description of the adults, male and female, and the young, several months ago\*. In case I should not have done so, I enclose a slip from the 'Sydney Morning Herald,' in which a portion of my notes appeared about the same time.

*Male.* Upper surface bright grass-green; forehead crimson bounded by a band of bright verditer blue, which extends through the lores, and, narrowing round the eye, reaches to the ear-coverts; from the base of the lower mandible, extending over the ear-coverts, an oblong patch of crimson, bounded below by a patch of deep blue; outer webs of primaries and secondaries deep blue; inner webs blackish brown; shoulders tinged with blue, under surface of the shoulders bright green, having a narrow band of yellow, formed by a series of spots of the larger under wing-coverts; across the centre of the wing a larger band of yellow, formed by a series of elongated marks on all but the second and third primaries; a longitudinal spot of red on the inner webs of the third and fourth tertiaries nearest the body; the remainder of the wings on the under surface blackish brown; whole of the under surface of the body bright

\* [This description was never received. The species appears to be the same as *C. maccayi*, Gould, P. Z. S. 1875, p. 314, and Birds of New Guinea, pt. i. pl. 10.—P. L. S.]

green; on the sides of the breast, from under the wing, extending nearly to the flanks, is an oblong patch of bright yellow; under tail-coverts and flanks bright green, tipped with verditer; bill, tarsi, and feet dark-horn colour. Total length 5 inches, wings from flexure  $3\frac{3}{16}$ , tarsi  $\frac{7}{16}$ , tail  $1\frac{1}{2}$ ; bill from cere along the culmen  $\frac{9}{16}$ , width at base  $\frac{1}{2}$ .

*Female.* The female differs in having the whole of the sides of the face, from the base of the upper mandible to the ear-coverts, of a bright verditer blue; the outer and lower portions of the ear-coverts deep cobalt blue, and in having no trace of red on these parts. The spot on forehead just in front of the cere is of a duller and more of an orange-red than in the male; the breast and abdomen have a slight tinge of yellowish green.

*Hab.* Scrubs on coast-range near Cardwell, Rockingham Bay, Queensland.

*Young.* In the not quite adult birds the breast and under surface of the body is of a paler green, and has a decided yellow tinge. The cheeks are of a paler blue, and void of the red patch so conspicuous in the adult male. Bill pale horn-colour, darker at the tip.

*Remarks.* This very prettily marked species is the second of the genus *Cyclopsitta* now known to inhabit Australia; it is closely allied, although quite distinct from *C. coxeni*, Gould, being much smaller and more beautifully and distinctly marked about the face and head. The specimens now gracing the collection of William Macleay, Esq., M.L.A., of Elizabeth Bay, Sydney, those in the Australian Museum, and in the Dobroyde-Museum collection, from which the above descriptions have been jointly taken, were procured by Mr. K. Broadbent, taxidermist, during a collecting-tour in the neighbourhood of Cardwell. They were found feeding on the fruit of the native fig-trees, which abound in the dense scrubs and brushes clothing the margins of creeks and rivers at the foot of the coast-range. It is doubtless the northern representative of *Cyclopsitta coxeni*, which, I believe, has not been met with north of the Brisbane district.

### 3. Description of the Eggs and Young of *Rallina tricolor*, from Rockingham Bay, Queensland. By EDWARD P. RAMSAY, C.M.Z.S.

[Received August 24, 1875.]

I found this fine species of Rail by no means rare in the dense scrubs which fringe the rivers and creeks of the coast range near Rockingham Bay; but although tolerably plentiful, they are always very difficult to obtain, on account of the nature of the localities they frequent and their retiring disposition. They are seldom to be seen without lying in wait for them; and not always then can one obtain a shot, except, perhaps, at such close quarters as would entirely destroy them.

They move about more in the evenings and early morn, and at



night may be heard calling to one another as they traverse the dense masses of rank vegetation which abound in those districts. I never met them out of these scrubs, although thick swampy grass-beds close by were frequented by allied species.

They seem very local in their habits, a pair frequenting the same spot for months or perhaps the whole year round, and breeding near the same place year after year; the young soon begin to take care of themselves, and leave the parents before they are well able to fly. I found them some four or five months old in pairs.

The note resembles a hoarse croak quickly repeated in a somewhat mournful tone, and a quick "cluck cluck" when come upon suddenly. I was not fortunate enough to find the nest and eggs myself; but shortly after I left the Herbert river I received a fine set of these eggs from Inspector Robert Johnstone, to whom the bird is well known, and who assures me that after finding the nest and eggs he left it until he had twice seen the bird sitting thereon, that he might be perfectly sure there could be no mistake as to their identity.

I had informed Mr. Johnstone of my doubts as to the authenticity of the eggs mentioned by Mr. Gould, on the authority of Cockerell, who, I have been informed, did not actually take them himself, the eggs in question having been brought to his companion Mr. J. Thorpe by a black fellow. I have before me one of these *white* and so-called Rail's eggs, which I obtained from Mr. Thorpe on his return with Cockerell from Cape York, and can only say that it is remarkably like that of a *Pigeon* (!) in *every* respect.

The eggs forwarded by Inspector Johnstone, of the authenticity of which I have not the slightest doubt, have a pale cream or whitish ground-colour, sprinkled all over, but more thickly at the larger end of some, with irregular-shaped spots of light reddish chestnut, and a few of a lilac tinge appearing as if beneath the surface of the shell, having the characteristic form, markings, and colour of all true Rail's eggs. They are four in number, in length 1.5 to 1.6 inch, in breadth 1.07 to 1.1 inch. The nest was composed of a few leaves and grass, and hidden among thick débris at the root of a tree in a dense part of the scrub near Mr. Johnstone's camp. The young on leaving the egg are covered with a sooty-black down, having a dark plumbeous tinge on the under surface.

The young at about five months old have the upper surface of a dull dark brown tinged with olive and washed with light rufous brown on the back of the neck; the under surface is of a duller and more plumbeous brown, with a faint wash of rufous brown on the chest and under tail-coverts, which latter have two pale rufous bars on each feather; the under surface of the wings blackish dull brown, a band of white spots near the base, and a similar band about the middle of the quill-feathers; bill olive-brown; legs greenish olive; iris reddish brown. Total length 7 inches, wing 3.6, tail 1.5, tarsus 2 inches, bill .9.

4. Description of new Land and Freshwater Shells from India. By SYLVANUS HANLEY, F.L.S. &c.

[Received September 20, 1875.]

The first two of these fine shells were collected by W. Theobald, my coadjutor in the 'Conchologia Indica,' and have been figured, but not described, in that publication. As the specimens were unique, they have been retained for some years in the hope of obtaining other individuals; for the common practice of describing from single specimens should be avoided where practicable. The *Cyclophorus* has been delineated in the forthcoming final part of our joint work (pl. 144. f. 6), the *Ampullaria* in the preceding one (pl. 115. f. 2).

1. CYCLOPHORUS OPHIS, Hanl.

*T. depresso-turbiniformis, satis magna, late umbilicata, nitida, solidiuscula, lævigata, brunneo et albido concentrice undata vel nebulosa, ad basim albida, maculis parvis diversiformibus spirally fasciata; spira satis elevata, apice livido. Anfractus valde convexi, 5½-6, superne paululum planiores, celeriter (ultimus præsertim) accrescentes; sutura simplex. Apertura alba, permagna, unice hians, suborbicularis, latior quam alta, infra basim porrecta: labium acutum, late reflexum, undique expansum.*

Lat. circiter 2 poll.

Hab. Tenasserim.

Mus. Theobald.

This remarkable-looking shell reminds one of *C. tuba* in shape, and *C. siamensis* in painting. Our specimen has an indistinct, interrupted, whitish peripheral fillet; and its surface exhibits, when magnified, some faint and close-set spiral wrinkles upon the upper portion of the final volution.

2. AMPULLARIA THEOBALDI, Hanl.

*T. magna, solida, globosa, nitida, sublævigata, rugis incrementi umbilicum magnum versus subplicata; flavo-olivacea, antice (præsertim) vittis brunneis, et plerumque angustis, ornata. Anfractus spiræ vix elevatae, et sæpius erosæ, lati brevesque. Sutura profunda, in adultis subcanaliculata. Apertura elliptica; faux chocolati colore tincta; labium exterius albidum, seu flavescens, fusco-nigrescente subarticulatum; labium interius atrofusum.*

Long. et lat. 3½ poll.

Hab. Bhamao, Birmah (Theobald).

Mus. Hanley.

This magnificent shell is named in honour of my coadjutor in our illustrated Indian conchology, wherein it has been delineated. It has the general aspect of *A. zonata*, is broad in proportion to the height, and has apparently no fillets near its profound suture. The calcareous opercle is heavy, and within of a livid smoke-colour.

The specimen described seems old, though in fine condition; of course its characters will be modified in less-mature examples. I state this because I suspect that some young fragile shells from the Naga hills may prove identical.

### 3. *ACHATINA* (*GLESSULA*) *SENATOR*, Hanl.

*T. subovato-conoidea, nonnunquam angustior, tenuis, nitida, lævigata, chocolati colore tincta, vitta flavesciente seu pallida conspicue ornata. Anfractus convexi, multo latiores quam alti (in exemplo imperfecto  $6\frac{1}{2}$ ), celeriter accrescentes, infra suturam valde impressam vitta perangusta, et supra suturam vitta lata (in anfractu ultimo paululum supra medium posita) picti. Spira circiter dimidium testæ occupans; apex pallidior, subito obtusus. Columella brevis, pallidior, subito obtusus. Columella brevis, pallida, arcuata, late truncata.*

Long. 1.

*Hab.* In Indiâ meridionali.

*Mus.* Beddome, M'Andrew.

Only four specimens are known to me, all from the Cottyam Hills: two are young and rather narrow in proportion to the fine but broken-lipped example I have described, which once belonged to the celebrated Indian conchologist W. Benson; it will be figured in the 'Conchologia Indica' (pl. 155. f. 4).

### 4. *ACHATINA* (*GLESSULA*) *ISIS*, Hanl.

*T. turrito-subcylindracea, lævis, tenuis, nitidissima, albida seu pallida, nonnunquam vitta angusta fulva, lineis perparvis fulvis confertis circumcincta: vitta variabilis seu sæpius versum basim anfractuum superiorum et supra medium anf. ultimi posita. Anfractus circiter 10, convexi, sensim accrescentes, ad suturam profundam sub lente obsolete subcrenati, multo latiores (ultimo excepto) quam alti: apex obtusus. Apertura angusta, quartam partem totius altitudinis paululum superans. Columella brevis, arcuata, oblique contorto-truncata.*

Long.  $1\frac{1}{3}$  poll., lat.  $\frac{2}{7}$  poll.

*Hab.* Indiam meridionalem.

*Mus.* Hanley.

A figure of this will be found in the 'Conchologia Indica' (plate 155. f. 5). The hair-like lines and narrow fillet seem peculiar to the species: the fillet, however, is neither constant, nor fixed as to position.

### 5. *UNIO VULCANUS*, Hanl.

*T. solida, inæquilateralis, subovata, viridis, undique (nisi fortasse ad extremitatem anticam) plicato-rugosa; plicæ (seu tubercula elongata confluentia) undatim angulariter et oblique ordinatæ. Margo dorsalis posticus et margo ventralis convexi, subparalleli. Costa umbonalis nulla; area postica nequaquam concava. Lunula lata, haud multum impressa. Margarita alba, vix minime iridescens. Margo cardinalis latus; dentes cardinales solidi,*

*lacerati*; in *valvula sinistra dens lateralis inter duos valvulæ dextræ insertus*.

Long. 1 poll., lat.  $1\frac{1}{3}$  poll.

*Hab.* Birmah, vel Pegu.

*Mus.* Hanley.

The beaks are eroded in our only specimen of a shell (Conch. Indica, pl. 155. f. 3), which reminds us somewhat in structure of the *Unio tavoyensis* of Gould. When held before a light the valves appear of a yellowish green, richly embossed with zigzag ridges of a darker or bluer verdure. The hinge is nearly the same as in *U. favidens* of Benson, the central teeth being short and very complicated.

5. Further Observations on *Alcyoncellum speciosum*, Quoy et Gaimard, and *Hyalonema mirabile*, Gray. By J. S. BOWERBANK, LL.D., F.R.S., F.Z.S., &c.

[Received September 24, 1875.]

On Wednesday the 8th September, 1875, I received a jar of specimens from Commodore Parish, of Hong-Kong, which he stated he obtained from the 'Challenger' when there. The specimens were preserved in spirit in the condition in which they were taken from the sea. They consisted of two specimens of *Alcyoncellum speciosum* with their dermal membrane and sarcodous substance in a fine state of preservation, one fine specimen of *Hyalonema mirabile* with the basal sponge in fine condition and with its dermal membrane in perfect preservation, and a fine head of a recent pentacrinite with about three inches of its stem with side arms in a good state of preservation. These specimens, especially those of *Alcyoncellum speciosum* and *Hyalonema mirabile*, are exceedingly interesting, as their perfect state of preservation enables us to complete our knowledge of their anatomical peculiarities to a much greater extent than those, in a more or less imperfect condition, with which we have hitherto been acquainted. On mounting in Canada balsam small portions of the two specimens of *Alcyoncellum speciosum*, I found in a fragment from near the distal end of one of them the beautiful dermal expansile system of reticulated structure, composed of slender rectangulate sexradiate spicula, the distal ray of each terminated by a spinulo-quadrifurcate sexradiate stellate spiculum, which is so beautifully exhibited in the highly interesting skeleton of the specimen from a sponge of the same species presented to me by my friend Dr. Millar, and described by me in Part IV. of my "Monograph of the Siliceo-fibrous Sponges," in the Society's 'Proceedings' for 1875. The complete envelopment of these beautiful tissues by the dermal sarcode of the specimens in a natural state renders the identification of these delicate defensive organs by no means an easy task; and in truth, without the indications of their forms and proportions afforded by Dr. Millar's specimens, we could scarcely have hoped to detect them *in situ* amidst the dense amber-coloured sarcode in

which they are immersed. Their complete immersion in the sarcode immediately beneath the dermal membrane indicates in a very satisfactory manner their peculiar office as expansile portions of the dermal system, and as organs of defence for the preservation of that important portion of the structure of the sponge.

The specimen of *Hyalonema mirabile* is in a much finer state of preservation than any of those which I formerly examined, and described in the 'Proceedings' of this Society for 1867; and it has enabled me to complete the description of many parts of this extraordinary species of sponge, which the dilapidated condition of the specimens to which I then had access prevented me from determining with accuracy.

The total height of the specimen received from the 'Challenger' is sixteen and a half inches. The basal spongy portion is of a conical form, two inches in height; and the average diameter of the base of the cone is two and a half inches. It is a fortunate circumstance that the basal membrane and that of the upper or conical portion of the spongy mass are both in a perfect state of preservation. The basal portion of attachment is very sinuous and irregular, as if it had been adherent to an undulating surface which had been of somewhat soft consistence, so that it had been separated from it without the destruction of the basal membrane of the sponge. The apex of the spongy mass closely embraces the spiral column of the cloacal system; and the lower part of the spiral column is completely buried in the basal sponge. The corium, in a more or less perfect state, extends from the apex of the spongy cone for about seven inches of the remaining portion of the spiral column of spicula; the remainder of which is bare, but spirally twisted to very near its distal termination. The corium is studded with the usual mamilloid oscular organs; and none of them exhibited the slightest indication of polypiferous contents, which we should naturally have expected to find, had such parasitical creatures been present, in a living specimen fresh from the sea, as the one in course of description evidently was.

The adherent basal surface of the sponge has a distinctly marked boundary-line, consisting of a well-produced slightly compressed projecting ridge of membrane; and a difference of the structure of the basal and the upper portion of the dermal membrane is distinctly visible to the unassisted eye. This difference in their aspects arises from modifications in the reticular structures of the two parts to fit them for their respective offices.

When small portions of each of the parts of the membrane were mounted in Canada balsam, their differences in structure became strikingly evident. The same forms of spicula were to a greater or a less extent present in both, but the modes of their distribution and arrangement were very different. The rete of the basal portion is comparatively compact and strong, and closely approaching regularity. It is constructed with the long inflato-acerate spicula which are common to both parts of the membranous skeleton structure, but with a considerable mixture of large rectangulate sexradiate spicula, which

adds considerably to its strength ; and the membranes of the areas are abundantly supplied with the minute quadrihamate defensive spicula, which are all disposed on the membrane on their flat surfaces. In the structure of the upper portion of the dermal membrane the rete is open and diffuse, and the areas assume an irregular elongate form ; and the rete is composed only of large inflato-acerate spicula, without apparently any intermixture of the large rectangulate sex-radiate ones, which are of such common occurrence in the basal portion of the membrane. Another distinctive structural difference is, that the areas in the rete of the dermal membrane are furnished in a strikingly beautiful manner with the spinulate cruciform defensive spicula, which are abundantly disposed on all parts of the surface at nearly equal distances from each other in a manner closely approaching regularity ; and nearly all of them are projected at right angles to the surface on which they are based. The minute quadrihamate spicula so abundant on the basal membrane are very rarely to be detected on the upper dermal one.

These structural modifications of the dermal membrane indicate the difference in the respective offices of the two parts of the animal in a very striking manner ; but not to a greater extent than we may observe in many sessile British sponges under similar circumstances.

A minute description of these characters of the respective parts of the dermis of the sponge are especially necessary, as much misapprehension has existed in the minds of some naturalists as to the true position of *Hyalonema* in its natural locality, some having imagined that the pointed end was deeply plunged into the bottom of the sea, and that the sponge-mass was the distal termination of the animal.

In all sponges with which I am acquainted, the attachments are either adhesive, or clasping like the roots of Fuci, never penetrative like the roots of plants that derive nutriment from the soil, which sponges never do. The idea of the slender pointed distal termination of *Hyalonema* being plunged into the sea-bottom, and thus supporting a heavy mass of sponge at its opposite end, is contrary to all we really know of the usual habits of these animals in their natural localities. In corroboration of this opinion, I may state that amongst the various specimens of this species of sponge which I possess, I have one thirteen inches in length, the distal extremity of which for six inches of its length is completely enveloped by the corium, which has the usual mamilloid organs upon it up to the extreme apical termination. These organs, which have been supposed to be polyp-cells, would have been in a very strange position had they ever been immersed in the soft substance of the sea-bottom. In further elucidation of this subject, I may refer my readers to an article on *Hyalonema* in 'Land and Water,' for February 13, 1871, p. 219, written, I am informed, by a naval officer of the name of Templar. He writes :—"For Dr. Bowerbank's theory concerning *Hyalonema*, 'or the long glass-rope sponge,' and his belief in the siliceous spicula growing upwards, the sponge adhering to a rock, I have great respect as well as belief. His friend, Mr. Henry Lee, wrote to me when in Japan to try and discover 'if such was the case ;' and from what I

could glean I found it was so. Two English gentlemen saw it brought up by divers from the bottom, who stated it grew sponge downward and spicula upwards. Upon stating this to an awful authority of the British Museum he said, 'Pshaw! Japanese always stuff up Europeans,' and added by way of proof, 'we hauled up some the other day in the Bay of Biscay with a hook and line, and the spongy stuff came up first, so it must be so.'"

6. On a Collection of Butterflies from the New Hebrides and Loyalty Islands, with Descriptions of new Species. By ARTHUR G. BUTLER, F.L.S., F.Z.S., &c.

[Received October 2, 1875.]

(Plate LXVII.)

It will be remembered that I published a list of the Butterflies of the South-Sea Islands in the 'Proceedings' for 1874, in which I enumerated 104 species, reported by various entomologists as occurring in that interesting region. In the present paper I propose to give a list of the species recently sent to the British Museum by our indefatigable correspondent W. Wykeham Perry, Esq., H.M.S. Pearl, as the result of a short cruise through the New Hebrides.

Mr. Perry writes, "We made such a hurried run through the group, that I had but a few hours to spend at each place which we visited, and therefore less opportunity than I had hoped to have of making a more varied collection."

Notwithstanding the short time in which the whole of the species were captured, they represent a most interesting and instructive consignment, not only as clearing up difficulties respecting some of the forms inserted with hesitation in my previous list, but because nearly half of them are new to science—one or two being, moreover, referable to genera which have ever been especial favourites with lepidopterists.

Fortunately, Mr. Perry has sent good series of several of the commoner species; so that their constancy is now firmly established, and all doubt of their being variations or sports of other Butterflies is at once set at rest.

The following is a list of the species.

1. *DANAIS PUMILA*, Boisduval.

Maré, Loyalty group, May 1875.

Previously only known from New Caledonia.

2. *DANAIS HEBRIDESIA*, n. sp. (Plate LXVII. fig. 6.)

♀. Allied to *D. pumila*, but considerably larger, the wings proportionally longer; primaries with the outer margin distinctly sub-angulated below the apex; basal yellow area rather paler; the sub-apical band more oblique, and consequently longer; secondaries with the upper discocellular scarcely perceptibly angulated; the

outer border broader, dark brown, becoming reddish on the margin; wings below paler, the discoidal cell of secondaries without any trace of longitudinal streaks: expanse of wings 2 inches 9 lines.

Aneiteum, New Hebrides, 22nd April 1875.

*Danais pumila* is a very constant and small species, measuring 2 inches 1-2 lines in expanse; the female has come in this collection; I therefore have no hesitation in considering the above insect from Aneiteum perfectly distinct.

### 3. *DANAIS MODERATA*, n. sp.

♀. Allied to *D. hamata*, from which it differs in the reddish basal costa of primaries, and in having all the subhyaline spots smaller, narrower, and paler in colour; wings below redder in tint: expanse of wings 3 inches 5 lines.

Vaté or Sandwich Island, New Hebrides, 28th April 1875.

*D. hamata* seems to have its representatives everywhere; whenever we receive an Indian or Indo-Australian collection, some form of it is almost sure to come. The following are now in the collection of the British Museum:—

1. *D. septentrionis*, from India; 2. *D. microsticta*, from Borneo; 3. *D. leucoptera*, New Guinea; 4. *D. hamata*, Australia; 5. *D. melittula*, Upolu; 6. *D. obscurata*, Solomon Islands; 7. *D. moderata*, Sandwich Islands.

### 4. *EUPLŒA HELCITA* ♀, Boisduval.

Erromango Island, New Hebrides, 10th May 1875,

### 5. *EUPLŒA LAPEYROUSII* ♂, Boisduval.

Havannah, Vaté or Sandwich Island, 30th April, 1875; Mota Island, New Hebrides, 5th May, 1875.

### 6. *EUPLŒA TORVINA*, n. sp.

♂. Nearly allied to the preceding, with the same elongated sericeous streak on upper surface of primaries, but slightly longer in the wing, altogether deeper in colour, and with the marginal area and anal angle of secondaries much less pale; no subapical diffused whitish streak in primaries; the same differences below, but much more evident, the costa of secondaries also nearly straight and the litura on first median interspace of primaries elongated into a streak: expanse of wings 3 inches 1 line.

Aneiteum, 22nd April, 1875.

### 7. *CALLIPLŒA IPHIANASSA* ♂, ♀, Butler.

Aneiteum, New Hebrides, 22nd April, 1875.

Two forms of this species occur, one having the submarginal spots of primaries large towards costa, the other having them small; this modification is found in both sexes.

### 8. *CALLIPLŒA SERIATA*? Herrich-Schäffer.

Maré, Loyalty group, May 1875.



One example is smaller than usual, and has lost most of the sub-marginal spots on under surface of secondaries: the description by Herrich-Schäffer is scarcely sufficiently explicit.

9. *CALLIPLCEA TULLIOLUS* ♀, Fabricius.

Erromango Island, New Hebrides, 10th May, 1875.

10. *MELANITIS TAITENSIS*, Felder.

Aneiteum, New Hebrides, 22nd April, 1875; Tanna, 23rd April 1875.

11. *MELANITIS SOLANDRA*, Fabricius.

Tanna, New Hebrides, 23rd April, 1875; Vaté or Sandwich, 30th April, 1875.

Four examples of this form, exhibiting no variation on the upper surface of the wings.

12. *MYCALESIS MUTATA*, n. sp.

Nearly allied to *M. hesione*, but deeper in colour, and with the ocelli below separated by a space from the central white streak and touching the submarginal lines: expanse of wings 1 inch 9 lines to 2 inches.

Erromango, New Hebrides, 10th May, 1875.

This is the first species of this genus hitherto recorded from the South Seas; in marking it nearly approaches *M. cinerea*: Mr. Perry remarks respecting it, "saw but few of these in Erromango, and none in any other island."

13. *MYCALESIS LUGENS*, n. sp.

Allied to *M. lalassis*; ocelloid spot on upper surface of primaries scarcely visible: wings below dull sepia brown, crossed at the middle by a slightly irregular, continuous, slender, black-edged, whitish line; primaries with four ocelli (the first two placed obliquely, the fourth largest), black, white-pupilled, with dull ochraceous irides and brown zones enclosed by a pale brown line; a rather wide sinuated marginal area pale brown, intersected by a blackish line: margin black; fringe pale brown; secondaries with seven ocelli, (the first and fifth largest, the second and third smallest), similar to those of primaries, but brighter in colour, marginal area as in primaries; body greyish brown: expanse of wings 1 inch 8 lines.

Vaté or Sandwich Island, New Hebrides, 28th April, 1875.

This is most like the Bornean form of the series generally referred to *M. lalassis*; the latter requires examination, as it clearly represents several well-marked species.

14. *DOLESCHALLIA HERRICHII*, n. sp.

*Doleschallia bisaltide*, Herrich-Schäffer (nec Cramer).

This species, as I supposed, differs considerably from *D. bisaltide*, as follows—primaries much less falcated, the black area deeper in colour and covering half the wing, the marginal area being much

broader; short ochreous fascia beyond end of cell narrower and deeper in colour; the spot which follows it (at the end of the subapical series of white spots) white or nearly white, and placed further off; secondaries shorter, with the dark spots and submarginal lines blacker; below, all the markings brighter and better defined, the silvery spots present in the male, which is generally more deeply coloured, whilst the female is paler in tint than *D. bisaltide*: expanse of wings 2 inches 10 lines to 3 inches.

Erromango Island, New Hebrides, May 1875.

15. *DOLESCHALLIA MONTROUZIERI*, n. sp.

*Nymphalis polibete*, Montrouzier (nec Cramer).

Above very like the preceding species, but much smaller, the lower black spot of secondaries with a lilacine pupil; below much like *D. polibete*, but duller in colour, with the ocelli proportionally larger and better defined: expanse of wings 2 inches 5 lines.

Vanua Levu, New Hebrides, 6th May, 1875.

This species cannot be mistaken for *D. polibete*, the upperside being altogether brighter in colouring, with the black-brown area much more sharply defined as in *D. bisaltide*. It seems that I did not go far enough in my anticipations with regard to *Doleschallia*; I expected only to see one new form from the South Seas, whereas two have been discovered.

16. *CHARAXES CLITARCHUS* \*, Hewitson.

Maré, Loyalty group, May 1875.

This scarce and beautiful species has hitherto been unique in Mr. Hewitson's collection from New Caledonia; our example is rather larger, and has the primaries slightly more falcated than the type; it also differs, in several unimportant points, in pattern and coloration.

17. *DIADEMA NERINA*, var. Fabricius.

Erromango, New Hebrides, 10th May, 1875.

One example of a handsome variety of *D. nerina*, in bad condition; it approaches *D. proserpina* in colouring, but has the oblique subapical band of primaries clouded with fulvous.

18. *DIADEMA PERRYI*, n. sp. (Plate LXVII. fig. 3.)

Size and form of *D. montrouzieri*: general character of pattern as in *D. pandarus*.

♂. Wings above deep brown; several streaks across the cell, a broad oblique postmedian diffused band, and two submarginal undulated bands separated only by a black line, pale brown; a bifid subapical costal spot placed obliquely on the subcostal branches, and six rounded discal spots parallel to the margin, all white with a narrow lilacine edging; secondaries with the discal area from just beyond the cell abruptly paler, becoming tawny ochreous externally, and bounded near the outer margin by a series of ochreous lunulated

\* Exot. Butt. V. *Char.* pl. iv. figs. 16, 17 (Oct. 1873).

spots; centre of discal area traversed by eight violaceous ocellated spots with white pupils and black margins; outer margin dark brown intersected by a lunated paler brown line; fringe white-spotted: body black-brown: wings below paler than above, all the markings lighter, the discal spots larger, pale blue with white centres and black edges: body brown, legs and palpi streaked with white: expanse of wings 3 inches 11 lines.

♀ paler than the male, the lighter parts especially; postmedian band of primaries sordid white; ocelli smaller: expanse of wings 3 inches 11 lines.

Erromango, New Hebrides, 10th May, 1875.

This is one of the finest species that has hitherto come from the South Seas.

19. *ATELLA BODENIA*, M. R. Butler.

Maré, Loyalty group, May 1875.

Much darker than the type from the Friendly Islands, and consequently more like *A. egista*, but smaller and darker; I am now satisfied that I was right in considering the *A. egista* of Herrich-Schäffer synonymous with *A. bodenia*.

20. *LAMPIDES PLATISSA*, Herrich-Schäffer.

Erromango, New Hebrides, May 10th, 1875; Maré, Loyalty group, May 1875.

This species seems to be very common.

21. *LAMPIDES SAMOA*, Herrich-Schäffer.

Erromango, New Hebrides, May 1875.

This species seems to me to be the *L. caledonica* of Felder.

22. *LAMPIDES ARMILLATA*, n. sp.

♂. Above copper-brown with violet reflections; base blackish with blue reflections; marginal edge black; fringe grey; secondaries with two subanal black spots bordered with yellowish brown; body blackish clothed with grey hairs; palpi white at the sides; antennae white spotted with black above, club black above, tawny below: wings below stone-colour; primaries with a spot at end of cell, a slightly curved series across the disk, and a very indistinct marginal series whitish brown bordered with reddish brown and whitish; secondaries greyer than primaries, speckled with black at base; a spot at end of cell, a series all round it, and an indistinct marginal series drab margined with dark brown and white; marginal series in both wings with central brown spots; anal black spots spotted with brilliant silver and bordered with straw-yellow: body grey, speckled with black: expanse of wings 9 lines.

Vaté or Sandwich Island, New Hebrides, 24th and 28th April, 1875.

23. *LAMPIDES DEPLORANS*, n. sp.

Allied to the preceding. Wings above dark grey, becoming

blackish at the extremities; secondaries with two indistinct black subanal spots; body black: wings below pale grey; primaries with outer margin broadly brown, diffused internally; a spot at end of cell and an irregular transverse discal series grey, outlined with dark brown and white; secondaries with a constricted spot at end of cell enclosed by a double series of spots grey, outlined with dark brown and white; a discal series of lunules parallel to the margin and enclosing a submarginal series of spots, the three nearest to anal angle large, black, speckled with metallic steel-coloured scales; extreme margin black, fringe brown, varied with sordid white; body grey: expanse of wings 11 lines.

Maré, Loyalty group, May 1875.

I was at first inclined to consider this the female of the preceding species; but the outline bands of the underside do not quite agree, and there are three instead of two metallic speckled spots in secondaries; these differences, taking the different habitat into consideration seem to indicate a distinct species.

24. *LAMPIDES CARISSIMA*, n. sp. (Plate LXVII. figs. 4, 5.)

Allied to *L. candrena*. ♂. Bright Morpho-blue, with the outer margin narrowly black; secondaries with two linear subanal black spots; abdominal margin brown; tail black, tipped with white; body blackish grey; collar white behind the eyes; frons with two cream-coloured lines; palpi white below; antennæ black, annulated with white below: wings below drab, with whitish-edged bands as in *L. candrena*; secondaries with two subanal black spots, speckled with pale metallic-blue scales and bordered above by orange lunules; body greyish at the sides, white below: expanse of wings 1 inch 2 lines.

♀. Above paler blue, with broad blackish grey borders along the costæ and outer margins; secondaries with a submarginal series of blue-edged black spots; abdominal margin brown; body grey, thorax bluish, head as in the male; underside nearly as in the male, but paler, all the markings well defined, edged with white: expanse of wings 1 inch  $1\frac{1}{2}$  line.

Erromango, New Hebrides, May 10th, 1875.

We have this species in the collection of the British Museum from the Navigators' Islands.

25. *LAMPIDES CANDRENA*, Herrich-Schäffer.

Tanna, New Hebrides, 23rd April, 1875.

This and the preceding are two of the most beautiful of the small blue butterflies; they belong to the *L.-democritus* group.

26. *LAMPIDES EVANESCENS*, n. sp.

♂, ♀. Allied to *L. celianus*, from which it differs in the slightly shorter wings and broader black border to primaries above, the more distinct marginal spots of secondaries, the greyer tint of the underside, with narrower and somewhat differently arranged transverse white bands; subanal black spots of secondaries smaller, with larger

orange zone: expanse of wings, ♂ 1 inch 2 to 4 lines, ♀ 1 inch to 1 inch 4 lines.

Erromango, New Hebrides, May 10th, 1875.

The white bands on the under surface of secondaries are not separated at such equal distances as in *L. celianns*.

27. *LAMPIDES ARGENTINA* ♀, Prittwitz.

Tanna, New Hebrides, 23rd April, 1875.

A rare species, of which we previously only possessed the male.

28. *LAMPIDES PERASIA* ♂, ♀, Felder.

Tanna, New Hebrides, 23rd April, 1875.

29. *LYCÆNA PHŒBE*, Murray.

Vaté or Sandwich Island, New Hebrides, 28th April, 1875; Erromango, New Hebrides, May 1875.

The undescribed *L. communis* of Herrich-Schäffer is this species, of which I believe his *L. alsulus* to be only a dark female. We obtained most of his South-Sea *Lycænidæ* from the Godeffroy Museum.

30. *LYCÆNA CADUCA*, n. sp.

Wings above lilac, primaries with the costa, apex, and outer margin broadly dusky; secondaries with the costal half and outer margin dusky; a submarginal series of blackish dots, margined internally by sordid white lunules: body grey; antennæ black, annulated with white: wings below pale grey, fringes long, tipped with grey; primaries with a spot at end of cell, a discal transverse series of six spots, and a submarginal series bounded internally by a connected series of lunules, all dusky brownish, edged with white; secondaries with a spot at end of cell surrounded by an irregular double series of spots, and a submarginal series bounded by lunules internally, all coloured as in primaries; body below white: expanse of wings 9 to 10 lines.

Erromango, New Hebrides, May 1875.

This is one of the smallest of the blues; it seems most nearly to approach the *L. knysna* group.

31. *SCOLITANTIDES EXCELLENS*, n. sp. (Plate LXVII. figs. 1, 2).

Allied to *S. cleotas*, but differing in the male having the purple colour spread over the primaries and the centre of secondaries, in the absence of a black spot at end of discoidal cell, the black veins, and the smaller orange patch on the secondaries.

♂. Above shining dull violet, veins black; primaries with the outer margin narrowly greyish black; secondaries with the costal area grey, outer margin narrowly black, preceded on discoidal median and interno-median interspaces by a sinuated quadrifid orange patch; abdominal margin grey; body blackish, abdomen with whitish margins to the segments; antennæ black, annulated with white: eyes with a white zone; palpi white below: wings below grey,

crossed by large white-edged black spots, nearly as in *S. cleotas*; secondaries with a large orange patch; body below sordid white: expanse of wings 1 inch 5 lines.

♀. Black-brown above, with larger orange patch in secondaries; otherwise as in the male: expanse of wings 1 inch 6 lines.

Tanna, New Hebrides, 3rd April, 1875.

32. *TERIAS SULPHURATA*, n. sp.

Nearly allied to *T. cesiope*, but of a sulphur- rather than a saffron-yellow colour, the black margin of primaries also more perpendicular above the sinus and consequently slightly narrower towards the costa; markings below not so much pronounced, but otherwise very like: expanse of wings 1 inch 9 lines.

Maré, Loyalty group, May 1875. (Two examples.)

33. *TERIAS VARIATA*, n. sp.

Only differs from the preceding in its much smaller size: expanse of wings 1 inch 3 to 4 lines.

Erromango, New Hebrides, 10th May, 1875.

Three examples of this form came, but much injured. Mr. Perry remarks that they seem to be very common all over the New Hebrides; he, however, confounds the following small species with them, the differences being slight between the various species in this genus.

34. *TERIAS HEBRIDINA*, n. sp. (Plate LXVII. fig. 8.)

Very like *T. senegalensis*, but of a more sulphurous tint, smaller, and with the black border of primaries continued as a quadrate spot along inner margin as in *T. hecabe*: expanse of wings 1 inch 5-6 lines.

Tanna, New Hebrides, 23rd April, 1875; Erromango, New Hebrides, 10th May, 1875.

Five examples of this species came. It is probably the *T. hecabe* of Herrich-Schäffer, and consequently of my list, although not the same as the Australian example mentioned by me as in the British-Museum collection.

35. *TERIAS INANATA*, n. sp.

Only differs from the preceding in the entire absence of markings on the under surface of the wings: expanse 1 inch 5 lines.

♂, Mota Island, 5th May, 1875; ♀, Erromango, 10th May, 1875.

36. *TERIAS PUMILARIS*, n. sp. (Plate LXVII. fig. 7.)

Sulphur-yellow; primaries with the costal margin blackish, outer margin rather broadly and regularly brown-bordered, the border being bisinuated within the median interspaces; secondaries with brown spots at terminations of the nervures, sometimes concurrent; body blackish: wings below paler yellow; nervures terminating in black dots; an annular marking at the terminations of the discoidal cells; secondaries with an annular marking on the subcostal area near the

base; body pale dull yellow: expanse of wings 1 inch to 1 inch 3 lines.

Tanna, New Hebrides, 23rd April, 1875; Vaté, New Hebrides, 30th April, 1875.

This species belongs to the *T. hecabe* group, but differs from all its allies in its narrow elongated primaries with more rounded apex: the sinuation of the outer border is also much less marked; so that the insect has a very different aspect.

37. *CATOPSILIA LACTEA*, Butler.

♂, ♀, Erromango, New Hebrides, 10th May, 1875.

The male is too much worn to be placed in the collection; but the female is quite fresh; in all probability therefore the male appears a month or so earlier than the female, as in many other butterflies.

38. *BELENOIS PERISTHENE* ♂, ♀, Boisduyal.

Erromango, New Hebrides, May 10th, 1875.

Mr. Perry says that he "observed this butterfly in Maré Island, Loyalty group." It seems to be a common species.

39. *BELENOIS NABIS* ♂, ♀, Lucas.

Vaté, 28th and 30th April, 1875; Erromango, New Hebrides, 10th May, 1875.

The series sent by Mr. Perry (one pair of which was taken *in copulâ*), clearly demonstrates its identity with *B. periclea* of Felder.

40. *PAPILIO HYSICLES*, Hewitson.

Tanna, New Hebrides, 23rd April, 1875.

The example sent is smaller than the typical form, and does not show the orange submarginal lunules on upper surface of secondaries.

41. *PAPILIO ABSTRUSUS*, n. sp.

Wings above black, fringe varied with cream-colour; primaries with a narrow postmedian oblique cream-coloured band separated into seven divisions by the nervures, a subapical cream-coloured litura, and five other less distinct squamose submarginal lituræ; secondaries with a rather large cream-coloured patch, beginning at costal nervure (where it is narrow) and continued to the base of the second median interspace, angularly irregular on its outer edge, and having six divisions owing to its crossing the end of the cell; two elongated squamose creamy submarginal lunules between the tail and anal angle; tail rather short, scarcely spatulate; a deep crimson spot on inner margin, just below the abdominal fold: body deep brown, head, collar, and margins of tegulæ spotted with sordid pale yellow; antennæ black: wings below black, fringe varied with cream-colour, nervures at base and several parallel diverging lines from the base of the discoidal cells pale yellow; primaries with postmedian band and subapical spot broader than on the upper surface seven, well-marked squamose cream-coloured submarginal lunules; secondaries with the patch of upper surface continued as a narrow band to the inner

margin and bounding a large oval orange-red spot on inner margin; between the red spot and the broad central part of the creamy band a few scattered blue scales; a discal submarginal series of large spots orange-red with creamy lateral edges; body dull brown, palpi, legs, and venter streaked with pale yellow: expanse of wings 3 inches 9 lines.

Maré, Loyalty group, May 1875.

This is a most puzzling species: above it has somewhat the aspect of *P. nephelus* with the hind-wing spot of *P. helenus*; but below it agrees better with *P. godeffroyi* than with any other *Papilio* at present known to me.

With the preceding collection of butterflies Mr. Perry sent three examples of a small Homopterous insect closely allied to *Turandina australis* of Walker, from Vaté Island. He says, "This insect was found numerous under the leaves of shrubs in dark parts of the bush."

#### EXPLANATION OF PLATE LXVII.

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| Fig. 1. } <i>Scotitantides excellens</i> , p. 616. | Fig. 6. <i>Danaïs hebridesia</i> , p. 610. |
| 2. } <i>Dialema perryi</i> , p. 613.               | 7. <i>Terias pumiliaris</i> , p. 617.      |
| 3. } <i>Lampides carissima</i> , p. 615.           | 8. — <i>hebridina</i> , p. 617.            |
| 4. }   |  |
| 5. }   |  |

#### 7. On a small Collection of Butterflies from Fiji.

By ARTHUR G. BUTLER, F.L.S., F.Z.S., &c.

[Received October 20, 1875.]

Mr. W. Wykeham Perry has recently sent us the Lepidoptera obtained during his late visit to the Fiji Islands—thirteen examples, referable to six species, as follows:—

#### Family NYMPHALIDÆ.

##### Subfamily DANAINÆ.

##### Genus EUPLŒA, Fabricius.

#### 1. EUPLŒA PROSERPINA, Butler (four examples, nn. 266-269).

♂, Ovalau 30th June, 1875; ♂ ♀ *in copula*, Vanua Levu, 3rd July.

I had not previously seen the female of this species; it is rather larger than the male, and the secondaries are slightly paler in tint; all the white spots are larger, the inner margin of primaries straighter, and the silky streak is absent.

##### Subfamily SATYRINÆ.

##### Genus XOIS, Hewitson.

#### 2. XOIS SESARA, Hewitson (two examples, nn. 263, 264).

♂ ♀, Ovalau, 30th June, 1875.

This is a very common species.



## Subfamily NYMPHALINÆ.

## Genus JUNONIA, Hübner.

## 3. JUNONIA VILLIDA, Fabricius (one example, n. 265).

♀, Ovalau, 30th June, 1875.

Also a common species.

## Genus DIADEMA, Boisduval.

## 4. DIADEMA PALLESCENS, Butler (two examples, nn. 259 &amp; 261).

♂, Ovalau, 30th June, 1875.

The male was not previously in the Museum collection; it is most like *D. alemene*, but smaller, with smaller bluish spots above; below the primaries are redder at the base, and have an oblique postmedian band (as in the male of *D. nerina*); the secondaries also differ in the smaller submarginal whitish spots, and in having a white central band: expanse of wing 3 inches 6 lines.

## Family LYCÆNIDÆ.

## Genus LAMPIDES, Hübner.

## 5. LAMPIDES CANDRENA, Herrich-Schäffer (two examples, nn. 270 &amp; 271).

♂, Vanua Levu, 3rd July, 1875.

## Family PAPILIONIDÆ.

## Genus PAPILIO, Linnaeus.

## 6. PAPILIO SCHMELTZI, Herrich-Schäffer (two examples, nn. 260 &amp; 262).

♂, Ovalau, 30th June, 1875.

Both examples of this rare and handsome species are in good condition. It is highly satisfactory to have thus obtained Dr. Herrich-Schäffer's species from the typical localities. I am also interested to see that the *Diadema auge* of that author (but not of Cramer) is my *D. pallescens*; for it is additional evidence of the constancy of the latter species: his remarks respecting it are as follows:—

“Jedenfalls nur aberratio, im Habitus und der Zeichnungsanlage ganz mit polymena Fld. Nov. t. 55. f. 5, 6 übereinstimmend, aber beiderseits ohne schwarzen Streif vor dem Saume. Die O Seite ist schmutzig ockergelb, gegen die W braun, an der kleineren Spitzenhälfte der Vfl und hinter der Zelle der Hfl weisslich. Unten in Z 1 b und 2 vor dem Saume ein weisser, dunkel umzogener Quersfleck.”

The above description suits *D. pallescens* ♀ in all respects, excepting, perhaps, the part relating to the spot in cells 1 b and 2, which may or may not be correct, seeing that it is impossible to guess what cells are meant.

8. Descriptions of several new Species of *Sphingidæ*.

By ARTHUR G. BUTLER, F.L.S., F.Z.S., &amp;c.

[Received October 20, 1875.]

## Genus PROSERPINUS, Hübner.

## 1. PROSERPINUS ÆNOTHEROIDES, n. sp.

Size, form, and pattern of *P. ænothæra*, but the primaries greyish white, with the band and subapical spot dull brownish ochreous, and the external area yellowish olivaceous; black band of secondaries rather narrower; body grey, with the crest, middle of collar, tegulæ, and dorsum ochraceous; antennæ shorter: wings below paler, with all the markings ochraceous or yellowish olivaceous instead of olive-green; fringe of primaries and discoidal area brown: expanse of wings 1 inch 10 lines.

Brazil.

Type, B.M.

If we had not obtained this from a collection of Brazilian Sphinges, and labelled "Brazil," I should have considered it merely a pale variety of *P. ænothæra*; as it is, I can only consider it a geographical form of that species.

## Genus LOPHURA, Walker.

## 1. LOPHURA HIMACHALA, n. sp.

Allied to *L. masuriensis*, differs as follows:—altogether darker, the primaries with a black waved band from just beyond the end of the cell to the outer margin, where it expands and curves downwards to the external angle; an irregular external black marking from apex to first projection of outer margin; all the pale markings obsolete; secondaries with the outer border blacker and slightly narrower; outer margin waved, but not undulated; expanse of wings 1 inch 8 lines.

N.E. Himalayas (*Farr*).

Type, coll. F. Moore.

## 2. LOPHURA SANGAICA, n. sp.

Also allied to *L. masuriensis*; primaries much browner; a large slightly paler area, bordered by a blackish line, situated upon the inner margin; the dark line runs from external angle in a curve to end of cell, and then obliquely downwards to the middle of the inner margin; all the pale markings obsolete; secondaries with the external border more uniformly dark brown, not undulated, only half the width, not reaching the anal angle, but terminating in a small blackish spot; body greyish, markings not defined: expanse of wings 1 inch 7 lines.

Shanghai.

Type, coll. F. Moore.

## 3. LOPHURA EREBINA, n. sp.

Nearly allied to the preceding, differs from *L. masuriensis* as follows:—primaries blackish brown, black transverse lines less distinct, pale markings obsolete; secondaries with outer border much darker,

about half the width, abruptly failing just before anal angle, outer margin not undulated; body greyish, markings obsolete: expanse of wings 1 inch 7 lines.

N.W. India.

Type, coll. P. Moore.

### Genus PERGESA, Walker.

#### 1. PERGESA MONGOLIANA, n. sp.

Like a small example of *P. velata* from Darjeeling, but differing as follows:—central band of primaries above much less defined, more oblique, touching the inner margin at external angle, only black at its lower extremity; remainder of the wing decidedly darker, so as to obscure the markings; discal area pale towards the apex and (in two diffused spots) between first and second median interspaces; secondaries with the pale streak sharply defined at anal angle, where it forms a distinct, triangular, ochraceous spot; eyes and tegulae clearly bordered with white; sides of coxae and venter dull rose-colour: primaries below with outer brown border wider, paler areas red, a yellow patch towards apex, and a diffused yellow spot on second median interspace; secondaries red, greyish on interno-median area, costa tinted with yellowish: expanse of wings 2 inches 2 lines.

Nankow Pass, between Mougolia and China (*Swinhoe*).

Type, B.M.

The following is a description of the metamorphoses, from drawings made by a native Japanese artist under the superintendence of Mr. George Lewis:—

*Larva*. Whity brown at the sides, becoming gradually sandy brown towards the dorsal region, which is of a still deeper tint; the sixth and succeeding segments reticulated with dark brown; anterior portion of dorsal region on each of these segments obliquely blackish, quite black in front of the horn, which is normal in shape and testaceous; anterior segments slightly deeper in colour, with two lateral longitudinal lines, the inferior one indistinct and brown, the superior one black and terminating on the fifth segment in a large bipupillated black ocellus with yellowish iris and black margin; a subdorsal blackish litura on the anterior segments; head, venter, and claspers greyish brown, spotted with whitish; the feet black; thoracic legs testaceous: length 3 inches 1 line.

*Pupa*. Whity brown, clouded with grey, and mottled with whitish below (particularly in front); anterior portion of segments reddish; a lateral longitudinal series of black spiracular spots, with whitish borders: length 1 inch 5 lines.

The larva feeds upon balsam.

*P. mongoliana* appears to be not uncommon in Japan, and probably occurs also in China; the larva is not unlike the darker form of *Chærocampa lewisii*.

### Genus CHÆROCAMPA, Duponchel.

#### 1. CHÆROCAMPA PRUNOSA, n. sp.

Nearly allied to *C. rosina*, the wings longer and narrower, altogether

much darker in colouring; primaries much more grey in tint; costal margin pale brown, not white; all the bands narrower, the pale lines, and the broad pale band much narrower, the latter intersected down the centre (not within its inner half) by a brown line; secondaries almost black, the red band much deeper in colour and half the width; body darker; the sides of the abdomen brassy rather than reddish golden; wings below darker, external border much greyer; sides of venter more yellowish golden: expanse of wings 3 inches.

Ceylon (*Skinner*).

Type, coll. F. Moore.

This is a well-marked southern representative of *C. rosina*.

## 2. *CHEROCAMPA PUELLARIS*, n. sp.

Nearly allied to *C. oldenlandiæ*, considerably smaller, and altogether paler in colouring; primaries comparatively broader and shorter; the bands broader and slightly waved; secondaries with the pale band wider and whity brown; body with the bands broader, silvery border of tegulae strongly marked: wings below paler, external border whiter; pectus whiter, venter without longitudinal central whitish streak: expanse of wings 2 inches.

Rawul Pindi (*Hellard*).

Two examples, coll. F. Moore.

This is a well-marked and interesting little species.

## 3. *CHEROCAMPA INTERSECTA*, n. sp.

Nearly allied to *C. silhetensis*, but narrower in the wings; the black oblique band of primaries narrower and straighter; the pale buff band almost immediately following it considerably narrowed, owing to the fact that the innermost of the five discal dusky lines is placed further from the margin, and consequently runs exactly through its centre; pale rosaceous band of secondaries broader, more uniform in width; body darker above, lateral streak on abdomen less golden, dorsal line more silvery; markings below less defined: expanse of wings 2 inches 6 lines.

Queensland (*Janson*).

Type, B.M.

This is evidently the Australian representative of *C. silhetensis*.

## Genus *DILUDIA*.

Under this genus I should wish to correct an error which has accidentally crept into a former paper.

P. Z. S. 1875, p. 260, n. 57: For *Diludia rufescens*, read *Diludia rubescens*.

This is important, as the name *rufescens* has been used before.

## 9. On the Herons of the Argentine Republic, with a Notice of a curious Instinct of *Ardetta involucris*. By W. H. HUDSON, C.M.Z.S.

[Received October 30, 1875.]

I have observed Herons a great deal, and am strongly inclined to adhere to Buffon's opinion that they are wretched, indigent birds,

condemned by the imperfections of their organs to a perpetual struggle with misery and want.

Much as the different species vary in size, from the *Ardea coccy* to the diminutive Variegated Heron of Azara (*Ardetta involucris*), no bigger than a Snipe, there is yet much sameness in their conformation, language, flight, nesting and other habits. They possess a snake-like head and neck, and a sharp taper beak, with which they transfix their prey as with a dart—also the serrate claw about which so much has been said, and which has been regarded as an instance of pure adaptation. A curious circumstance has come under my observation regarding Herons. Birds in poor condition are very much infested with vermin; whether the vermin are the cause or effect of the poor condition, I do not know; but such is the fact. Now in this region (the Argentine Republic) Herons are generally very poor, a good-conditioned bird being a very rare exception; a majority of individuals are much emaciated and infested with intestinal worms; yet I have never found a bird infested with lice, though the Heron would seem a fit subject for them, and in the course of my rambles I have picked up many individuals apparently perishing from inanition. I do not wish to insinuate a belief that this immunity from vermin is due to the pectinated claw; for though the bird does scratch and clean itself with the claw, it could never rid the entire plumage from vermin by this organ, which is as ill adapted for such a purpose as for “giving a firmer hold on its slippery prey.”

The Spoonbill has also the serration, and is, unlike the Heron, an active vigorous bird, and usually fat; yet it is much troubled with parasites, and I have found birds too weak to fly and literally swarming with them.

I merely wish to call the attention of ornithologists to the fact that in the region where I have observed Herons, they are exempt in a remarkable degree from external parasites.

Much has also been said about certain patches of dense, clammy, yellowish down under the loose plumage of Herons. These curious appendages may be just as useless to the bird as the tuft of hair on its bosom is to the Turkey-cock; but there are more probabilities the other way, and it may yet be discovered that they are very necessary to its well-being. Perhaps these clammy feathers contain a secretion fatal to the vermin by which birds of sedentary habits are so much afflicted, and from which Herons appear so strangely free. They may even be the seat of that mysterious phosphorescent light which some one has affirmed emanates from the Heron's bosom when it fishes in the dark, and which serves to attract the fish, or to render them visible to the bird. Naturalists have, I believe, dismissed the subject of this light as a mere fable without any foundation of fact; but real facts regarding habits of animals have not unfrequently been so treated. Mr. Bartlett's interesting observations on the Flamingoes in the Society's Gardens, show that the ancient story of the Pelican feeding its young on its own blood is perhaps only a slightly embellished account of a common habit of the bird. The story of the scorpion “girt by fire” turning its weapon upon itself, may also be

adduced ; for whenever naturalists who have the opportunity take pains to investigate the matter, they will find the so-called fable simple fact—also that some excessively irritable individuals do not require to be surrounded by fire, but will sting themselves to death when merely teased with a stick. The argument I have used is weak enough ; but until the contrary is conclusively shown, it is reasonable to assume that the clammy patches are of some advantage to the Heron.

I have not observed Herons fishing by night very closely ; but there is one fact inclines me to believe it probable that some species might possess the light-emitting power in question. I am satisfied that the *Ardea cocoi* possesses as keen a vision by day as any feathered creature, Raptores excepted : the streams on the level pampas are so muddy that a fish two inches below the surface is invisible to the human eye ; yet in these thick waters the Herons fish by night and by day. If the eye is adapted to see so well in the day, how can it see so well at night, and under such unfavourable circumstances, without some such extraneous aid to vision as the attributed luminosity ?

Heron, of all birds, fly the slowest ; but though incapable of progressing rapidly when moving directly forward, when pursued by a Raptor the Heron performs with marvellous ease and grace an aerial feat unequalled by any other bird, viz. that of rising vertically to an amazing height in the air. The marvellous ease and celerity with which the pursued ascends until it becomes a mere speck in the blue zenith, the hurried zigzag flight of the pursuer, rising every minute above its prey, only to be left below again by a single flap of the Heron's wings, forms a sight of such grace, beauty, and power that the mind of the beholder is filled with delight and astonishment. I believe these displays are unfrequent ; for I have spent many years in regions abounding in Hawks and Herons, and have very rarely seen a Heron attacked.

When the enemy comes to close quarters, the Heron instinctively throws itself belly up to repel the assault with its long crooked cutting claws. All Raptorial species possess a similar habit ; and the analogous correlation of habit and structure in genera otherwise so widely separated is very curious. The Falcon uses its feet to strike, lacerate, and grasp its prey ; the Heron to anchor itself firmly to its perch ; but for weapons of defence they are equally well adapted, and are used in precisely the same manner. The Heron, with its great length of neck and legs, its lean unballasted body, large wings and superabundance of plumage, is the least suited of birds to perch high ; but the structure of the feet renders it perfectly safe for it to do so. Thus the Heron is enabled to sit on a smooth enamelled rush, or on the summit of a tree, and doze securely in a wind that, were its feet formed like those of other waders, would blow it away like a bundle of dead feathers.

In the Variegated Heron (*Ardetta involucris*), the least of the tribe, the perching-faculty probably attains its greatest perfection, and is combined with locomotion in a unique and wonderful manner.

This little Heron frequents beds of reeds growing in rather deep water. Very seldom, and probably only accidentally, does it visit the land; and only when disturbed does it rise above the reeds; for its flight, unlike that of its congeners, is of the feeblest: but it lives exclusively amongst the reeds, that, smooth as a polished pipe-stem, rise vertically from water too deep for the bird to wade in. Yet the Heron goes up to the summit or down to the surface, and moves freely and briskly about amongst them, and runs in a straight line through them almost as rapidly as a Plover runs over the bare level ground.

Unless I myself had been a witness of this feat, I could scarcely have credited it; for how does it manage to grasp the smooth vertical reeds quickly and firmly enough to progress so rapidly without ever slipping downward through them? I will return anon to this bird to give an account of an instinct it possesses far more interesting than the one I have just recorded.

Another characteristic of Herons is that they carry the neck, when flying, folded in the form of the letter S. At other times the bird also carries the neck this way; and it is, indeed, in all long-necked species the figure the neck assumes when the bird reposes or is in the act of watching something below it; and the Heron's life is almost a perpetual watch. Apropos of this manner of carrying the neck, so natural to the bird, is it not the cause of the extreme wariness observable in Herons? Herons are, I think, everywhere shy of disposition; with us they are the wildest of water-fowl; yet there is no reason for their being so, since they are never persecuted.

Birds ever fly reluctantly from danger; and all species possessing the advantage of a long neck, such as the Swan, Flamingo, Stork, Spoonbill, &c., will continue with their necks stretched to their utmost capacity watching an intruder for an hour at a time rather than fly away.

But in the Herons it must be only by a great effort the neck can be wholly unbent; for even if the neck cut out from a dead bird be forcibly straightened and then released, it flies back like a piece of india-rubber to its original shape. Therefore the effort to straighten the neck, invariably the first expression of alarm and curiosity, must be a painful one; and to keep it for any length of time in that position is probably as insupportable to the bird as to keep the arm straightened vertically would be to a man. Thus the Heron flies at the first sight of an intruder, whilst the persecuted Duck, Swan, or other fowl continues motionless, watching with outstretched neck, participating in the alarm certainly, but not enduring actual physical pain.

Doubtless in many cases habits react upon and modify the structure of parts; and in this instance the modified structure has apparently reacted on and modified the habits. In seeking for and taking food, the body is required to perform certain definite motions and assume repeatedly the same attitudes; this is most frequently the case in birds of aquatic habits. A facility for assuming at all times, and an involuntary falling into, these peculiar attitudes and gestures,

appears to become hereditary ; and the species in which they are most noticeable seem incapable of throwing the habit or manner off, even when placed in situations where it is useless or even detrimental. *Tringa* rapidly peck and probe the mud as they advance ; Plovers peck and run, peck and run again. Now I have noticed scores of times that these birds cannot possibly lay aside this habit of pecking as they advance ; for even a wounded Plover running from his pursuer over dry barren ground, goes through the form of eating by pausing for a moment every yard or so, pecking the ground, then running on again.

The *Sceloporus frenata*, and probably other true Snipes, possesses the singular habit of striking its beak on the ground when taking flight. In this instance has not the probing motion, performed instinctively as the bird moves, been utilized to assist it in rising?

Grebes on land walk erect like Penguins, and have a slow awkward gait ; and whenever they wish to accelerate their progress, they throw themselves forward on the breast and strike out the feet as in swimming.

The Glossy Ibis feeds in shallow water, thrusting its great sickle beak into the weeds at the bottom at every step. When walking on land it observes these motions, and seems incapable of progressing without plunging its beak downwards into imaginary water at every stride.

The Spoonbill wades to its knees and advances with beak always immersed and swaying itself from side to side, so that at each lateral movement of the body the beak describes a great semicircle in the water ; a flock of these birds feeding reminds one of a line of mowers mowing grass. On dry ground, the Spoonbill seems unable to walk directly forward like other birds, but stoops, keeping the body in a horizontal position, and, turning from side to side, sweeps the air with its beak, as if still feeding in the water.

In the foregoing instances (and I could greatly multiply them), in which certain gestures and movements accompany progressive motion, it is difficult to see how the structure can be in any way modified by them ; but the preying attitude of the Heron, the waiting motionless in perpetual readiness to strike, has doubtless given the neck its very peculiar form.

Two interesting traits of the Heron (and they have a necessary connexion) are its tireless watchfulness and its insatiable voracity ; for these characters have not, I think, been exaggerated even by the most sensational of ornithologists.

In birds of other genera, repletion is invariably followed by a period of listless inactivity during which no food is taken or required. But the Heron digests his food so rapidly that, however much he devours, he is always ready to gorge again ; consequently he is not benefited by what he eats, and appears in the same state of semi-starvation when food is abundant as in times of scarcity. An old naturalist has suggested as a reason for this, that the Heron, from its peculiar manner of taking its prey, requires fair weather to fish—that during spells of bad weather, when it is compelled to suffer the



pangs of famine inactive, it contracts a meagre consumptive habit of body, which subsequent plenty cannot remove. A pretty theory; but it will not hold water; for in this region spells of bad weather are brief and infrequent; moreover all other species that feed at the same table with the Heron, from the little flitting *Ceryle* to the towering Flamingo, become excessively fat at certain seasons, and are at all times so healthy and vigorous that, compared with them, the Heron is but the ghost of a bird. In no extraneous circumstances, but in the organization of the bird itself must be sought the cause of its anomalous condition: it does not appear to possess the fat-elaborating power; consequently no provision is made for a rainy day, and the misery of the bird consists in its perpetual, never-satisfied, craving for food.

Some writers have expatiated on the extreme insensibility and apathy of the Heron, even charging it with neglect of self-preservation. This is not true; Herons have as keen a sense of danger as other birds, and their insensibility is only apparent.

We have seen how the Spoonbill, Ibis, and other species, when out of the water, continue to observe motions and assume attitudes practised when feeding; yet these birds require to be active, have a variety of movements and satisfy their hunger in less time than the Heron. The Heron has but one attitude, motionless watchfulness; so that when not actually on the wing or taking the few desultory steps it occasionally ventures on, and in whatever situation it may be placed, the level ground, the summit of a tree, or in confinement, it is seen drawn up, motionless and apparently apathetic.

But when we remember that this is the bird's attitude during many hours of the night and day, when it stands still as a reed in the water—that in such a posture it sees every shy and swift creature that glances by it, and darts its weapon with unerring aim and lightning rapidity, and with such force that I have seen one drive its beak quite through the body of a fish very much too large for the bird to swallow and cased in bony armour, it is impossible not to think that it is observant and keenly sensible of every thing going on about it.

I have made myself partially acquainted with the habits of eight of our Herons; but there is such a sameness in the way of life of these birds that most of what I could say about them would read like a mere repetition of what has been recorded concerning other species.

The Cooi (*Ardea cooi*) and the Common Heron of Europe, widely separated as are the continents they inhabit, are identical in habits.

The Argentine *Nycticorax* has one curious habit, but, apart from this, is like the Night-Herons found elsewhere. It lives in colonies of often more than fifty individuals, and perches aloft by day where trees abound; but the bird is also common in the marshes on the treeless pampas. Here the Night-Heron constructs platforms to perch on by breaking and bending the reeds across each other: this false nest is about a foot in diameter and ten or fifteen inches above the water.

A pair of Coois frequenting a stream close to a house I once lived

in several months, built two false nests on the water, ten or twelve yards from the shore.

It is worthy of notice that the *Myopotamus coypus* has a similar habit. The Coypus make great burrows in the banks of the water-courses they inhabit, but appear to use them, at least where there are reeds, only as a refuge from danger and to bring forth their young in ; for they also build platforms of reeds and pass the day lying on them. In some watercourses in Patagonia the Coypu (and it is there a third larger than the variety found on the pampas) has quite dropped the burrowing habit, doubtless on account of the sand and gravel soil, and lives entirely amongst the reeds, the female bringing forth her young on the reed platforms or nests.

I will give a fuller account of the little Variegated Heron, *Ardetta involucris* (Vicill.)\*, and particularly of its instinct of self-preservation.

The Variegated Heron is a silent solitary bird, frequents the marshy borders of the Plata, and is occasionally found in the reed-beds scattered over the pampas. It breeds amongst the close-growing rushes, and lays three spherical eggs of a rich lively green and beautiful beyond comparison.

The nest is a simple platform structure several inches above the water, and so very small that there hardly seems room enough on it for the eggs, which are very large for the bird. When one looks down upon them, they cover and almost hide the nest from view, and, furthermore, being green like the surrounding rushes, are not easy to discover.

When driven from its haunt, the bird flies eighty or a hundred yards off, and drops again amongst the rushes ; it is difficult to flush it a second time, but a third impossible. And a very curious circumstance is that it also seems quite impossible to find the bird in the spot where it finally settles. Being found in places where one can only enter on horseback, I could never succeed in shooting specimens when I wanted them, and was obliged to employ some Gancho boys, who had dogs trained to hunt young ducks, to try for the little Heron. They procured me a few specimens, and told me that, without the aid of their dogs, they could never succeed in finding the bird, though they always marked the exact spot where it alighted. This I attributed to the slender figure it makes, and to the colour of the plumage so closely resembling that of the withering yellow and spotted reeds always to be found amongst the green ones ; but I did not know for many years that the bird possessed a marvellous

\* In a paper by Messrs. Selater and Sulvin on Buenos-Ayres birds, published in the Society's 'Proceedings' (1869, p. 631), *Ardetta erythromelas* is given as a synonym of *A. involucris* ; but it is added :—"We are, however, inclined to doubt very much whether this is really the young of *A. erythromelas*, as referred by Bonaparte, Burmeister, and other authors, and prefer waiting for other examples before arriving at a definite conclusion on this point." Closely as the two birds are related in form and colour, the difference in size might well induce a doubt as to their being merely the young and adults of one species. In Buenos Ayres *A. involucris* is not uncommon, but I have never met with *A. erythromelas*, nor do I believe it ranges so far south.

instinct that made its peculiar conformation and imitative colour far more advantageous than they could be of themselves.

One day in November 1870, when out shooting, I noticed a little Heron stealing off quickly through a bed of rushes, thirty or forty yards from me; he was a foot or so above the ground, and went so rapidly that he appeared to glide through the rushes without touching them. I fired, but afterwards ascertained that in my hurry I missed my aim. The bird, however, disappeared at the report; and thinking I had killed him, I went to the spot.

It was a small isolated bed of rushes I had seen him in; the mud below and for some distance round was quite bare and hard, so that it would have been impossible for the bird to escape without being perceived; and yet, dead or alive, he was not to be found. After vainly searching and researching through the rushes for a quarter of an hour, I gave over the quest in great disgust and bewilderment, and, after reloading, was just turning to go, when, behold! there stood my Heron on a reed, no more than eight inches from, and on a level with, my knees. He was perched, the body erect and the point of the tail touching the reed grasped by its feet; the long slender, tapering neck was held stiff, straight and vertically; and the head and beak, instead of being carried obliquely, were also pointing up. There was not, from his feet to the tip of the beak, a perceptible curve or inequality, but the whole was the figure (the exact counterpart) of a straight tapering rush: the loose plumage arranged to fill inequalities, the wings pressed into the hollow sides, made it impossible to see where the body ended and the neck began, or to distinguish head from neck or beak from head. This was, of course, a front view; and the entire under surface of the bird was thus displayed, all of a uniform dull yellow like that of a faded rush. I regarded the bird wonderingly for some time; but not the least motion did it make. I thought it was wounded or paralyzed with fear, and, placing my hand on the point of its beak, forced the head down till it touched the back; when I withdrew my hand, up flew the head, like a steel spring, to its first position. I repeated the experiment many times with the same result, the very eyes of the bird appearing all the time rigid and unwinking like those of a creature in a fit. What wonder that it is so difficult, almost impossible, to discover the bird in such an attitude! But how happened it that while repeatedly walking round the bird through the rushes I had not caught sight of the striped back and the broad dark-coloured sides? I asked myself this question, and stepped round to get a side view, when, *mirabile dictu*, I could still see nothing but the rush-like front of the bird! His motions on the perch as he turned slowly or quickly round, still keeping the edge of the blade-like body before me, corresponded so exactly with my own that I almost doubted that I had moved at all. No sooner had I seen the finishing part of this marvellous instinct of self-preservation (this last act making the whole entire), than such a degree of delight and admiration possessed me as I have never before experienced during my researches, much as I have conversed with wild animals in the wilderness, and many and perfect as are the in-

stances of adaptation I have witnessed. I could not finish admiring, and thought that never had any thing so beautiful fallen in my way before; for even the sublime cloud-seeking instinct of the White Egret and the typical Herons seemed less admirable than this; and for some time I continued experimenting, pressing down the bird's head and trying to bend him by main force into some other position; but the strange rigidity remained unrelaxed, the fixed attitude unchanged. I also found, as I walked round him, that, as soon as I got to the opposite side and he could no longer twist himself on his perch, he whirled his body with great rapidity the other way, instantly presenting the same front as before.

Finally I plucked him forcibly from the rush and perched him on my hand, upon which he flew away; but he flew only fifty or sixty yards off, and dropped into the dry grass. Here he again put in practice the same instinct so ably that I groped about for ten or twelve minutes before refinding him, and was astonished that a creature to all appearance so weak and frail should have strength and endurance sufficient to keep its body rigid and in one attitude for so long a time.

#### 10. On a new Species of Crown-Pigeon.

By OTTO FINSCH, Ph.D., C.M.Z.S.

[Received November 8, 1875.]

(Plate LXVIII.)

*GOURA SCHEEFMAKERI*, sp. nov. (Plate LXVIII.)

Slate-blue; wings and tail darker, the latter with a broad ashy apical margin; crop and breast of a dark vinaceous purplish brown; vent, lower flanks, and under tail-coverts of a lighter slate-blue than the upper parts; wings and tail at the inner webs and from below slate-black; the first six wing-coverts of the secondaries whitish ashy, narrowly tipped with blackish, the remaining coverts of the secondaries slate-black like the first row of the upper wing-coverts; the light whitish ashy area on the middle of the wing therefore margined above by a broad black cross band; remaining upper wing-coverts blackish, with dark slate-grey apical margins, the upper wing-coverts therefore darker than the back; lower wing-coverts slate-black; lores and eye-region black, forming a conspicuous area which extends to the base of the crown-feathers; a very high and compressed semicircular crest of a pale ashy colour passing into whitish ashy under certain lights, at the base bluish ashy; this crown, of which the longest feathers are about  $5\frac{3}{4}$  inches long, is composed in the same manner as in *G. coronata*, by the hairy radii being disunited and dispersed from the straight rhachis in an acute angle. Bill dark horn-colour, with a pale tip; feet blackish brown, toes lighter, nails blackish.

long. alc.	cand.	culm.	riet.	tars.	dig. med.	ung.
12'' 6'''	9''	16'''	23'''	3''' 2'''	19'''	7'''

The specimen above described I obtained by chance from a dealer in Holland. When at the Gardens of the Zoological Society at Amsterdam, Mr. Westerman called my attention to a living specimen of *Goura*, which he believed to be new\*, and which proved to be of the same species as my specimen. From my description, however, this specimen differs in some respects, having the throat and the smaller upper wing-coverts also vinaceous purplish brown, and the anterior coverts of the secondaries more decidedly whitish and tipped with purplish brown; otherwise the specimens agree in every respect. These differences probably depend on age or sex.

In the living bird the eyes are deep red, the legs and feet red, the bill blackish with pale tips.

This remarkable new Crown-Pigeon is intermediate between the two known species. It agrees with *G. victoria* in size and the coloration of the underparts, but differs in the composition of the crown-feathers, which exactly resemble those of *G. coronata*. In *G. victoria* these feathers are totally different, having a regularly webbed triangular disk at the apex, bordered very distinctly at the tip with white. *G. coronata*, of which the Leyden Museum possesses a series of nineteen specimens, never has the throat and breast purplish brown, but, on the contrary, has the back of this colour. As we know from the interesting account of Mr. Mitchell (P. Z. S. 1849, p. 169, t. xii.), *G. coronata* (male) and *G. victoria* (female) paired and produced a hybrid in the Gardens of this Society, which unfortunately died in a few days. Having regard to this fact we might incline to believe this new *Goura* to be a hybrid; but if this were really the case, the formation and composition of the crown-feathers would no doubt prove to be intermediate between those of the two parents. This is not the case in my specimen, which, in regard to the crest, agrees throughout with *G. coronata*; and so I cannot believe it to be a hybrid. I may remark that *G. coronata* shows great variation in colour according to its localities. Specimens from Sorong, on the west coast of New Guinea, opposite the island Salawatti, have the sides of head and nearly the whole of the under surface black; and this is also the case in specimens from the island of Waigion (*G. coronata minor*, Schleg.) and from Mysol ("abdomen et bas-ventre noir," Schlegel). But as between these black-varied specimens and those in the ordinary dress, there are many intermediate forms, and as, on the other hand, both forms occur in the same locality, I do not venture to consider the black-bellied form a distinct species.

Following the wishes of my esteemed friend Mr. Westerman, who wishes to express the feelings of thanks of himself and of the Royal Zoological Society of Amsterdam, I have the pleasure of naming this new species after Mr. C. Scheepmaker, of Soerabaya, who has presented to the Society many rare animals, and to whom also belongs the credit of having sent home the first specimens of this interesting new *Goura*.

Although the exact localities of my specimen and of that in the

\* See notice of the same bird by Mr. Selater, P. Z. S. 1875, p. 380.

Amsterdam Gardens are unknown, I am fortunate in being able to give the south end of New Guinea, opposite Yule Island, as the true habitat of *Goura scheepmakeri*, having been kindly informed by Mr. Selater that several specimens of it are contained in the last collection sent to the Civic Museum of Genoa, by the indefatigable Italian traveller Signor d'Albertis, from that locality.

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December 7, 1875.

George Busk, Esq., F.R.S., V.P., in the Chair.

The following report on the additions to the Society's Menagerie during the month of November 1875 was read by the Secretary:—

The total number of registered additions to the Society's Menagerie during the month of November 1875 was 98, of which 2 were by birth, 35 by presentation, 38 by purchase, 4 by exchange, and 19 were received on deposit. The total number of departures during the same period, by death and removals, was 124.

The most noticeable additions during the month were:—

1. A female Beisa Antelope (*Oryx beisa*) from Eastern Africa, presented by H.H. the Sultan of Zanzibar, and received November 8, 1875. This addition is the more welcome, as it makes a pair to the male of the same species presented by Admiral A. Cumming, R.N., in 1874. I believe that this is the only pair of this fine Antelope in Europe.

2. Two All-Green Tanagers (*Chlorophonia viridis*) from Brazil, purchased November 16, 1875. This species is new to the collection, and has not, so far as I know, been previously received in a living state.

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Mr. Selater exhibited a skin of *Hypocolius ampelinus*, Bp. (Consp. i. p. 336; Heuglin, Ibis, 1868, p. 181, pl. v.), which had been obtained by Mr. W. T. Blanford at Mazátani Nai, in Upper Scinde, to the west of Shikarpúr, in March 1875, as already recorded by Mr. Blanford in 'The Ibis,' 1875, p. 388. M. Oustalet, of the Muséum d'Histoire Naturelle, Jardin des Plantes, Paris, had kindly compared this specimen with an adult male example from Senaar, received from M. Botta (the original discoverer of this curious bird) in 1839, and had found them completely identical. M. Oustalet stated that there were three mounted specimens of *Hypocolius ampelinus* in the Gallery of the Paris Museum, received from M. Botta.

Mr. Selater remarked that this discovery was of special interest, as a further proof of the extension of some of the most characteristic types of the Æthiopian Fauna into Western India.

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Mr. Selater read an extract from a letter addressed to him by

Mr. H. A. Wickham, dated Piquiahíba, near Santarem, Brazil, July 31, 1875.

Mr. Wickham said, "It may interest you to know that the large blue Hyacinth Macaw (*Ara hyacinthina*) is to be found much nearer Santarem than has been hitherto supposed. I have just been for a three days' hunt through the forest covering the tableland south of this place towards the Curuá river. Along the sides of a water-course we traversed, these birds appeared to be quite common, their peculiar quavering caw being constantly heard; but so local did they seem to be, that five or six miles further on we neither saw nor heard them."

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Prof. Owen read the twenty-second of his series of Memoirs on *Dinornis*, containing a restoration of the skeleton of *Dinornis maximus*, Owen.

This paper will be published in the Society's Transactions.

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The following papers were read:—

1. Description of a new Species of *Dolichotis*. By Dr. HERMANN BURMEISTER, Director of the National Museum, Buenos Aires, F.M.Z.S.

[Received September 20, 1875.]

(Plate LXIX.)

The genus *Dolichotis*, one of the best-marked of the family *Caviini*, differs strikingly from the rest of the group in the great size of its ears. It was founded by Desmarest in 1822, the only known specimen having been first described by Azara under the Spanish name *Liebre patagona*. This animal is well known its native country under the last name, and is common in the districts of Upper Patagonia, near the Rio Negro, and in the western provinces of St. Luis and Mendoza, but was long rare in European collections.

The investigations of Darwin, Waterhouse, and myself (*Reise durch die La Plata-Staaten*, tom. ii. p. 422) have given full particulars as to its habits, external characters, and anatomy, the last-named part of its organization having been shortly described in my work above referred to.

Till now no second species has been known; and I was therefore surprised on receiving an animal, obtained by Dr. C. Berg, the able inspector of the Public Museum, which resembled the Patagonian Hare, but which indicated by the still greater size of its ears a new species of *Dolichotis*.

It is strange that an animal as large as a common rabbit should have escaped the notice of scientific men in a country so much visited by travellers of late years; but as this animal lives in a region remote

from the general route of travellers from the south to the north of the Argentine Republic, the fact becomes less surprising.

This species exists only in the vicinity of the great Central-Argentine desert known under the name of Salina, a waste covered by saline exudations, which forms the lower central part of the country, unsettled and almost devoid of vegetation. This region is now penetrated by the new Central Argentine Railway; and the specimens were killed near the stations Totoralejo and Recreo, about lat. 29° S. and long. 65° W. Therefore I propose to name the species

*DOLICHOTIS SALINICOLA*, sp. n. (Plate LXIX.)

The animal is well known to the inhabitants under the name *Cu-nejo* (rabbit), which name they also give to all the small species of Cavy which are common in more fertile parts of the country. It is esteemed by them good food; and many of this new species have long been eaten by the Ganchos. Its only activity and its retreat into the most sterile parts of the country (where investigations are difficult to make), also its habit of living in old caves in the ground (which it shares with the true species of *Cavia*), that could have preserved its existence.

The accompanying figure (Plate LXIX.) shows that this new species has the general appearance of the Patagonian Cavy, but has somewhat shorter legs and is of a smaller size, resembling in colours and figure the common rabbit.

The two specimens which have come under my notice are male and female, but are very much alike in appearance and colour; the female is somewhat more slender, and the head smaller.

The whole length of the head and body is 18 inches, height 9 inches in its natural position; the head 4 inches long, the neck 2 inches, the ears 2 inches high; the fore legs 5 inches from the elbow to the end of the toes, and the hind legs 7½ inches from the knee to the beginning of the toes, of which the longest is 1 inch long.

The fore feet have four small toes, every one with a short acute claw; the hind feet are provided with three larger toes with long claws, the middle one being much longer than the other two. The soles are naked, each toe has a small pad beneath the nail, and a second of remarkable thickness (especially behind) further back.

The hind foot has also a long naked black stripe on the back of the tarsus, commencing near the hock and descending to the central pad of the foot, but much narrower below.

The tail is not entirely wanting, but is represented by a short conical naked wart. In all these particulars this species agrees with the other from Patagonia. Beginning the detailed description with the head, the whole figure is broader and the lips thicker than in the true Cavies. The whole nose is covered with short hairs, and only a small blackish margin of the nostrils is naked; even the descending fold in the middle of the upper lip, so well known as a peculiarity in many of the *Glires* (and which sometimes occurs in a human being as a deformity), is covered with short white hairs. On the upper lip are many long black bristles, the longest of them being 3-4 inches



long; and two or three of the same kind, but somewhat shorter, stand over the eyes near the anterior angle. These organs are large, surrounded by narrow black naked margins, the upper margin furnished with a series of black bristles half an inch long, extending obliquely over the eye. The ears are placed 1 inch behind the eyes; and in front of each is a large naked blackish space descending to the neck. The external ear is 2 inches long, very broad at the base, deeply emarginate behind, and somewhat pointed above the emargination. The middle of the inside of the ear is bare; but the whole margin and the outside are covered with short hair; black on the outside and white within, the margins fringed with black hair which is long and dense on the upper part of the circumference.

The whole body of the animal is clothed with fine but simple hair, except the pads, already mentioned, and the tail-wart. The hair is generally one inch in length, becoming somewhat longer on the underside and gradually shorter on the legs, and very short on the feet and toes.

The colour of the animal is like that of the Wild Rabbit, but somewhat more red-brown on the upper parts of the body, especially behind. The hair is whitish grey at the base, ringed with black in the middle, then of a clear yellow or reddish yellow, which is succeeded by a smaller black ring near the tips. The tips of the hairs are abruptly thinner than in the middle, and black. The whole underside from the breast between the fore legs to the anus, the inside of the legs, and the rump are white; the lips, throat, two small spots before and behind the eye, and a somewhat larger spot behind the ear are also white; but the side of the head and the underside of the neck are clear reddish brown, especially the under portion of the cheeks between the lips and the ears. The iris is clear brown; and the claws are black.

The female has two teats in the inguinal region near the inside of the femur; and she seems generally to give birth to two young at a time, if she does not lose one, which, as is the case with the Patagonian species, seems to be very common. Three individuals are therefore often found together, as the two sexes live in company and are accompanied by their young as long as it is dependent upon them. Families of more than three are not seen; and the species is never found in bands as the Vizcachas.

The animal is very active, escaping with great rapidity under the small bushes of aculeate leguminous plants which are common in that part of the country, and hiding in the thickest of the bushes, where it seems to have its burrows. This species avoids open grounds, like the Patagonian Cavy.

Of the internal parts I know only the skull, which is entirely of the same form as that of *Dolichotis patagonica*, but much smaller, scarcely half the size. The skull has the same broad front, with the large superciliary margins and all the other peculiarities mentioned by Mr. Waterhouse (Nat. Hist. of Mam. vol. ii. p. 156). The teeth are the same; each of the four molars has two triangular lobes, except the smallest of the upper jaw; the first of the under jaw fur-

nished only with a short roundish prolongation on the fore part of the first lobe, and not with three as in the Patagonian species.

The incisors are narrow and clear yellowish on the anterior surface.

With respect to the three lobes of the first molar in the under jaw of *Dolichotis patagonica*, I may mention that this configuration is only found in very old specimens; in the young which have fallen under my notice there are only two lobes—the first with an oval prolongation in front as an accessory appendage, which becomes longer with age and is at last separated from its lobe, but remaining always smaller and with more rounded angles than the other two lobes. We have in the Public Museum skulls of different ages which clearly prove the gradual separation of the accessory lobe.

In the new species the first lobe of the same molar in the under jaw has a similar but not so well developed prolongation in front, which may also be separated from the main lobe with age.

Both my specimens are very young and show clearly the construction of the skull.

Buenos Aires, August 8th, 1875.

2. On some Stags' Horns from the Thian-Shan Mountains in Central Asia. By W. T. BLANFORD, F.R.S., F.Z.S., &c.

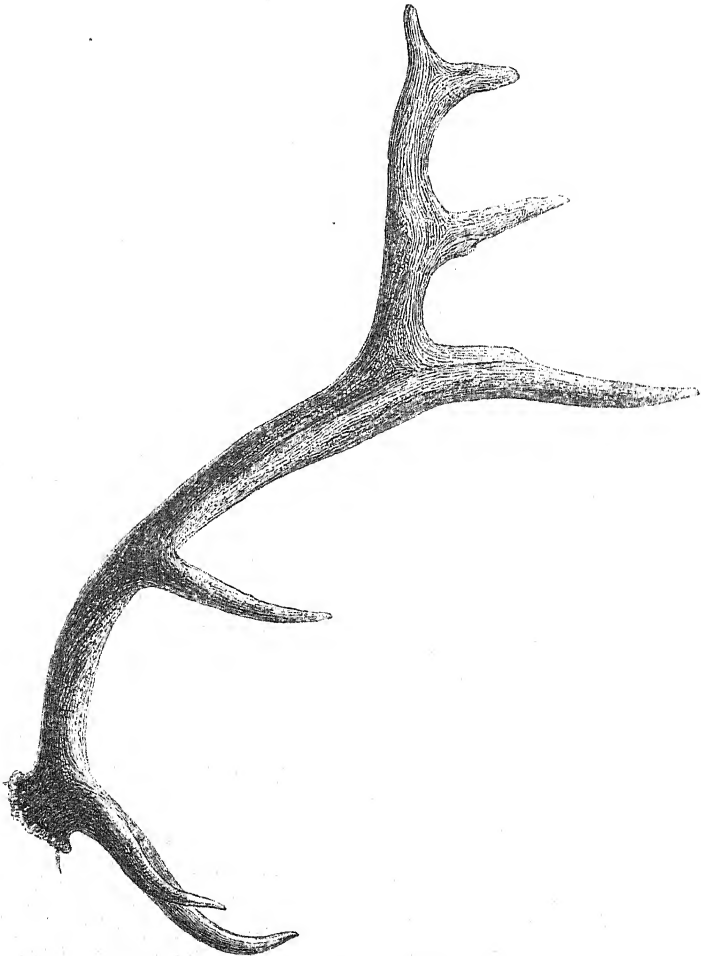
[Received October 28, 1875.]

Amongst the collections brought back by the expedition to Western Turkestan, to which the late Dr. Stoliczka was attached as geologist and naturalist, were several large Stag-horns said to have been brought originally from the Thian-Shan mountains. Like most of the finest and most valuable specimens in the collections, the greater number of these horns were dispersed after Dr. Stoliczka's death, and passed into private hands; but one pair of shed horns, which, although not belonging to the same animal, closely resemble each other in form and size, remain in the collection belonging to the Government, and have been intrusted to me for examination.

I was at first indisposed to give more than a general description of these horns; and in the list of Dr. Stoliczka's mammalian collections which I read to the Asiatic Society of Bengal in August last, I did not attempt to name them. But as the horns are very fine, and appear clearly to show the existence of a species hitherto undescribed, I think I may be justified in giving a fuller account of them, and proposing a name for the animal to which they belong.

The horns are of very large size, each measuring 51 inches in length round the curve; and one is 10·9, the other 10·5 inches in circumference just above the burr. Each shows seven well-formed points or tines, besides which one of the horns has a rudimentary bifurcation on the fourth and fifth tines, counting from the base. The beam is much curved; and, so far as can be judged from the

form of the burr and its probable position with reference to the head, the horns must have bent somewhat towards each other at the tips. The brow and bez antlers are close together, the former slightly exceeding the latter in length; and the bez, again, is a little longer than the royal or third tine. The greatest peculiarity is in the form of the crown. Above the royal the beam curves gently inwards; and some distance above it is bent rather suddenly backwards; and at this



Outer view of the right horn of *Cervus eustrphanns*.

point it gives out an anterior tine, which is much the longest of all, being only a little shorter than the upper part of the beam itself. Above this the beam gives out two other tines, successively diminishing in size, the last about equal to the terminal snag; and all these four upper points, with the beam itself, are distinctly compressed, so as to be subpalmate; and all four are in nearly the same plane, so that by looking at the horn with either the beam or the great fourth tine in front, the remainder of the crown can be completely concealed.

The nearest approach in form to these horns with which I am acquainted may perhaps be found in a pair figured by Severtzoff in his 'Turkestańskie Jevotnie,' p. 105, under the name of *Cervus maral*. The number of tines is similar; and there is some resemblance in their form and in the manner in which the beam curves backwards above the royal. These horns also, I believe, came from the Thian-Shan mountains, and they may perhaps belong to the same species. But in Severtzoff's figure the brow and bez antlers are much further apart, the beam appears less curved inwards above the royals, and the tendency to palmation in the crown is wanting, whilst the fourth tine scarcely exceeds the two next in size.

The horns now figured differ widely from those of *Cervus maral* represented in the 'Transactions of the Zoological Society,' vol. vii. p. 336, pl. xxix. The curve of the beam in the former is greater, the brow and bez antlers closer together and different in proportion and direction; and the crown is very dissimilar.

On comparing the Thian-Shan horns with those of *Cervus cashmirianus* and *C. affinis*, even greater differences will be noticed. The horns now described are smoother; the brow and bez antlers are closer together; the beam is bent backward towards the tip, which is not the case in the species from Kashmir and Eastern Tibet; and the form of the crown is utterly different. In *C. affinis* there are said never to be more than two, and in *C. cashmirianus*, as a rule, certainly not above three points above the royal, and there is not the slightest tendency to palmation.

Whatever Mr. Hodgson's *Cervus narayanus*\* (founded upon a single immature horn) may be, it is evidently something very different from the Thian-Shan species, its chief peculiarity being the great distance apart of the two basal tines.

It appears to me that the horns of the Thian-Shan stag approach those of the Wapiti more than they do those of any Asiatic deer. The general resemblance between the Asiatic stags and *Cervus canadensis* in the form of the antlers has been discussed by many naturalists, and by none more fully than by Mr. Blyth†, who has pointed out that the most important characters in which the horns of the American stag differ from those of the animals found in Eastern Tibet, Kashmir, and Persia are the smoothness of the former, their tendency to flattening or palmation in the crown, their greater subdivision in the upper portion, and the marked backward curvature and want of convergence in the upper part of the beam. Now in all

\* J. A. S. B. 1851, vol. xx. p. 392, pl. viii.

† J. A. S. B. 1853, vol. xxii. p. 592; 1861, vol. xxx. p. 185, &c.

these characters the horns procured in Eastern Turkestan are intermediate between those of the Asiatic stags and those of the Wapiti. The horns of the Thian-Shan stag differ from those of *C. canadensis* in being less smooth, more curved inwards towards the end, and in having the brow and bez antlers much nearer together; but they are much nearer in form to the Wapiti horns than to those of *Cervus cashmirianus* and *C. affinis*.

I notice that M. Severtzoff (Turk. Jev. p. 109) divides *Cervus maral*, with which he apparently identifies the Wapiti, into two varieties, the American and Asiatic, and again subdivides each into two races, those of Asia being called *sibirica* and *songarica*. Unfortunately the Russian language, which is employed, renders M. Severtzoff's remarks unintelligible to me, and I cannot say whether the form now described belongs to his *Cervus maral*, var. *asiatica*, *b. songarica*, or not; but I do not think it can be united to the true *Cervus maral*, and I therefore suggest the following name:—

*CERVUS EUSTEPHANUS*, sp. nov.

*Cervus corribus magnis, sublævigatis, valde curvatis, superne subplanulatis subpalmatisque, apices versus convergentibus atque retro productis, ramos ad septem gerentibus, ramis duobus primis subæqualibus, approximatis, tertio paullo minore, quarto maximo, basin versus planulato, una cum tribus ultimis gradatim deminuentibus subplano.*

*Hab.* in montibus Thian Shan dictis.

My information of the probable locality is derived from Captain Walter, to whom and to Captain Biddulph I am indebted for several notes on the animals of Eastern Turkestan.

3. Notes on *Phænicomanes iora*, Sharpe, and *Abrornis atricapilla*, Blyth. By O. FINSCH, Ph.D., C.M.Z.S.

[Received October 29, 1875.]

A comparison of the bird described and figured by Mr. Sharpe (P. Z. S. 1874, p. 427) under the first-mentioned title with the type of *Iora lafresnayei*, Hartl. (Rev. Zool. 1844, p. 401) in the Bremen Museum, has convinced me of their identity. We have just received from Malacca a second specimen, which shows the base of the feathers on back and shoulders green, exactly as in the figure given by Mr. Sharpe; so that there cannot be the slightest doubt that these two birds are identical.

As the habitat "Jamaica" for *Phænicomanes* rests only on a dealer's label, and is not verified by any collector's authority; we may believe that there has been a mistake, the certain locality of this species being "Malacca."

A still greater mistake was made by the late Mr. Blyth in describing "*Abrornis atricapilla*" (Ibis, 1870, p. 169) from China,

the type specimen of this species (which I examined in the Leiden Museum) being in fact "*Myiodioides pusillus*, Wils.," a well-known North-American bird. The base of the stand on which the stuffed "type" specimen is placed bears an original label by Dr. Gustav Schlegel, as having been the bird collected by him during his stay at Amoy; but this label has, no doubt, been unfortunately changed by the stuffer, and the ticket of a Chinese specimen fastened to an American bird. It may be added that the name *Abrornis atricapilla* was not given by Temminck, but is in Mr. Blyth's own handwriting.

4. On *Pristorhamphus versteri*, a new Genus and Species of Bird from the Arfak Mountains, New Guinea. By OTTO FINSCH, Ph.D., C.M.Z.S.

[Received October 29, 1875.]

During my recent stay at Leiden the Rijks Museum received a large and rich collection of birds from the Arfak Mountains in New Guinea, obtained by a Dutch traveller whose name I do not know. Besides fine and perfect specimens of the rarer Birds of Paradise (such as *Lophorina*, *Parotia*, *Paradigalla*, *Epinachus*, *Astrapia*), the collection contained, amongst other rare birds, skins of *Eupetes leucostictus*, ScL., *Melirrhophetes*, Meyer, *Pachycephala flavogrisea*, Meyer (which seems to form a peculiar genus), *Trichoglossus moesschenbroeckii*, *Carpophaga chalconota*, Salvad., and many others. There was also a sombre bird which Professor Schlegel and I took at first glance for the female of *Melanocharis* (*Dicaeum*) *nigra*; but on a closer examination it proved to be quite new, and to form even a new genus. This I propose to call

PRISTORHAMPHUS\*, gen. nov.

Allied to *Melanocharis*, ScL., but easily distinguished by the long, strongly rounded tail, and the long slender legs.

The structure of the bill corresponds exactly with that of *Melanocharis*, having the margins of both mandibles serrated, but with the serrations stronger and more visibly apparent, especially with the use of a glass.

The wing resembles that of *Melanocharis*: i. e. the fourth and fifth quills are the longest, the third and sixth a little shorter, the first short; but the second, instead of being equal to the seventh as in *Melanocharis*, reaches only the length of the ninth. It must be remarked that the second quill feather in *Melanocharis* shows a slight attenuation at the end of the inner web; but this peculiarity is only to be seen in old males; whereas females and young males have the second quill rounded at the apex as in *Pristorhamphus*.

The tail is strongly rounded and nearly equal to the length of the wing, whereas *Melanocharis* has a nearly even tail, which is much shorter than the wing.

\* Deriv. *πίστρη*=serra, et *ράμφος*=rostrum.

The tarsus is slender and considerably longer than the middle toe with the claw, whereas in *Melanocharis* the tarsus is only a little longer than the middle toe with claw. Otherwise the form of the feet and legs agree, the tarsus being also caligated in the new genus.

The species I propose to call

*PRISTORHAMPHUS VERSTERI*, sp. nov.

Whole upper surface, including sides of the head and neck, dull olive-green; quills and tail-feathers brownish black, margined on the outer web narrowly with a brighter, more yellowish olive-green; the external tail-feather on the inner web with a conspicuous large white median spot, which is less extended on the second tail-feather; remiges margined on the basal portion of the inner web narrowly with whitish; chin, throat, and remainder of underparts dull olive-grey, the sides of the breast washed with greenish olive-grey; the middle of the lower breast and vent changing into pale yellowish white; lower wing-coverts and the long axillary feathers silky white, washed with pale yellow; bill and feet black.

	Long. tot. millim.	ala. millim.	rectr. intern. millim.	rectr. extern. millim.	culm. millim.	tars. millim.	dig. int. incl. ung. millim.	
c. 130	62	57	47	10	23	15		<i>Pristorhamphus</i> .
c. 115	64	43	41	11	16	13	♂	<i>Melanocharis</i> .
c. 112	62	40	38	10	15	13	♀	,,

The collection contains only two specimens of the bird, which are precisely alike.

As they correspond in colour exactly with the female of *Melanocharis nigra*, it may be supposed that they do not exhibit the dress of the old male, which may probably turn out to be very different in coloration. But however this may be, this species will be always distinguishable by the white spot on the inner web of the two external tail-feathers, even without regard to the strongly marked generic differences.

I have great pleasure in naming this new and interesting although modestly coloured bird after my dear friend Mr. F. A. Verster, the meritorious Administrator of the Rijks Museum at Leiden, whose name deserves to be preserved in science and in the galleries of the National Museum of Holland.

5. Characters of six new Polynesian Birds in the Museum Godeffroy at Hamburg. By OTTO FINSCH, Ph.D., C.M.Z.S.

[Received November 8, 1875.]

Besides a bird from the Feejees, which has been collected and forwarded by Mr. Theodor Kleinschmidt, of Nai-Koro, Ovalau, and which proves to be new, I have the pleasure of characterizing five new species of birds from Ponape (or Puynipet), Seniavin group,

Eastern Carolines. Mr. Kubary, the well-known Godeffroyan traveller, has spent more than one year in exploring this island; but unfortunately all his collections were lost by the wreck of the ship.

The birds saved from this accident are referable to about nineteen species, of which no less than five are undescribed. An extended paper on the birds of Ponape will appear in the 'Journal of the Museum Godeffroy,' forming the second part of my "Ornithology of the Pacific Islands." Meanwhile I am anxious to publish the characters of the new species, which may stand as follows.

1. PETROICA KLEINSCHMIDTI, sp. nov.

Upper surface dark brown; sides of head and neck paler; middle of chin and throat whitish; crop and breast light red, remainder of underparts white; quills black-brown on the inner web, with a white cross mark commencing from the fourth quill; the last secondary is margined externally with rusty brown; coverts of the secondaries and upper wing-coverts margined at the end narrowly but distinctly with rusty brown; tail-feathers brownish black, the outermost on the apical half externally white, the second tail-feather only with a narrow white external margin and tip. Bill brownish black; feet brownish.

Long.	alæ.	caud.	culm.	tars.
$3\frac{3}{4}''$	$2''\ 1'''$	$15''$	c. $4'''$	$7\frac{1}{2}'''$

*Hab.* Feejee Islands, Tai-Levu or Viti-Levu (*Kleinschmidt*).

*Obs.* Differs from *P. pusilla*, Peale, from the Navigators', in lacking the white front and large white mark on the wing-coverts.

2. ZOSTEROPS PONAPENSIS, sp. nov.

Upper parts dark olive-brown, wings and tail darker, very narrowly margined externally with lighter brown; lores, sides of head and underparts brownish ashy, the flanks distinctly brownish; a narrow greyish eye-ring; feathers of front with narrow pale shafts. Bill blackish; feet dark plumbeous.

Long.	alæ.	caud.	rostr.	tars.
$3\frac{1}{2}''$	$2''\ 1'''$	$16'''$	$4'''$	$8'''$

*Hab.* Ponape, Seniavin group (*Kubary*).

Allied to *Z. (Tephros) finschi*, Hartl., but smaller, and the underparts distinct brownish ashy.

3. VOLVOCIVORA INSUPERATA, sp. nov.

Male like that of *V. monacha*, H. and F., but without black on the chin and throat, the whole under surface slate-grey; no distinct white margins on the inner web of the primaries, and the outer tail-feathers broadly pointed with slate-grey.

Female totally different from that of *V. monacha*. Head above, nape, and lores brownish grey; remainder of upper parts dark maroon-brown; rump, upper tail-coverts, and the whole under surface



bright dark cinnamon-rufous; quills brownish black, narrowly margined externally with rufous brown; two middle tail-feathers dark rufous brown, remainder brownish black with broad cinnamon-rufous tips.

Long.	alæ.	caud.	culm.	tars.
c. 7"	4"	3"	7 $\frac{1}{4}$ "	11"

*Hab.* Ponape, Seniavin group (*Kubary*).

#### 4. MYIAGRA PLUTO, sp. nov.

Uniform black, with greenish metallic reflections, especially on the head; bill and feet black. Female resembling the male; but the chin and throat are dark brown.

Long.	alæ.	caud.	culm. millim.	lulit. rostr. millim.	tars.
5 $\frac{1}{4}$ "	3"	2" 8"	13	8	8"

*Hab.* Ponape, Seniavin group (*Kubary*).

#### 5. RHIPIDURA KUBARYI, sp. nov.

Upper parts dark sooty brown; margin of front lores, cheeks, and ear-coverts brownish black; a white superciliary stripe, and a white stripe from the angle of chin below the cheeks to the ear-region; throat black; crop black, with white apical margins, giving these parts a squamated appearance; vent, anal region and under tail-coverts white; sides and lower wing-coverts slate-grey; tail-feathers brownish black, broadly tipped with white. Bill and feet black.

Long.	alæ.	caud.	culm. millim.	tars. millim.
e. 6"	2" 6"	3"	11	20

*Hab.* Ponape, Seniavin group (*Kubary*).

#### 6. APLONIS PELZELNI, sp. nov.

Obscure sooty brown; head above somewhat darker, lores and front changing into sooty black; wings, tail, upper and lower tail-coverts umber-brown, a good deal lighter than the remaining plumage. Bill and feet black.

Long.	alæ.	caud.	culm.	tars.
6 $\frac{1}{2}$ "	3" 10"	2" 4"	8 $\frac{1}{4}$ "	11 $\frac{1}{2}$ "

*Hab.* Ponape, Seniavin group (*Kubary*).

### 6. Notes on the Zoology of Rodriguez.

By J. CALDWELL, C.M.Z.S.

[Received November 8, 1875.]

Having been dispatched on special duty to the Island of Rodriguez immediately after the hurricane-season this year, I was detained nearly three months upon the island, and had an opportunity of making a few notes which may prove interesting, pending more de-

tailed information from the Naturalist who accompanied the Transit-of-Venus Expedition.

Geologically, the island is very similar to Mauritius, of basaltic origin; but a large portion of the south-western part is composed of very ancient upheaved coral, abounding in fissures and caverns large and small, a number of which were minutely explored and dug over by Mr. H. Slater in the latter end of last year.

So effectually had Mr. Slater done his work that though I several times visited the large caverns and some smaller fissures, I only succeeded in getting two Solitaire-bones, and at last I spent a couple of days consecutively in the search and got nothing. The next morning, after another ineffectual search, we were returning home to camp to breakfast, when Sergeant Morris of the Police Force went into a small hole to procure me a few semifossil shells of *Helix lewsheriana* (Morelet, Journal de Conch. 1875, p. 23), and found a magnificent tibia. Of course we all entered, and found the hole to be the entrance of a small but very well formed cavern of three stories formed like steps, none of the chambers being more than 10 feet square, and close alongside one of the large caverns in which a mass of bones had already been found. How it had been overlooked I am at a loss to conjecture.

We remained till half-past four, digging with hands, nails, and pointed sticks in the loose and nearly dry earth; and I obtained the remains of at least 37 birds, besides bones of Tortoises, Gulls (of several kinds) Bats, &c. &c., and many shells of Gasteropoda.

It was this same Sergeant Morris who, under the direction of Mr. George Jenner, had already procured for Mr. Edward Newton the handsome collection of Solitaire-bones on which he and his brother prepared the memoir published in the Phil. Trans. for 1869, vol. clix. Morris is an enthusiastic naturalist in his way; and had he, at the time when he collected these bones, had the slightest training, I have no doubt many perfect specimens would have been obtained, by keeping separate the bones which apparently belonged to any one bird.

Out of the number of birds I have mentioned, I got that day a skeleton all but complete. I suppose it to be a female, as the fighting bones are not largely developed, although the bird is evidently mature. On one side there are seven ribs complete; but I find no trace of the articulation of the eighth dorsal rib (see Messrs. Newton's paper, Phil. Trans. vol. clix. 1869, p. 334), though in another specimen there is about  $\frac{3}{4}$  of an inch of this rib existing on each side. The two pubic bones are in very good preservation; and though, unfortunately, one was broken off in taking the bones from the earth, I have been able to reunite it perfectly to the pelvis. The posterior extremities of these bones in different specimens present most singular variations. The pelvis is quite complete on the right side; but the posterior end is missing on the left; I am not sure, however, that I did not put it away at the time and that it will not be found: the caudal extremity is incomplete; but I found several detached bones, which I have not attempted to put in place.

It should be remarked that the ununited skeleton has not got the atlas bone. It was broken and so delicate, I did not dare to mount it.

The sternum is very complete, the outline being perfect except on the right side, where the lateral process is broken off, though I am not yet sure I have not got the fragment put aside. The furcula is unbroken, and very small when compared with the size of the bird. The head is very complete in every respect, and the cervical and dorsal vertebræ, on the whole remarkably well preserved, as are also the wing- and leg-bones: the feet are quite complete.

A second skeleton of a male (?) bird is far from being so perfect as the one just described, but still will make a capital specimen. One side of the sternum is complete, the head very nearly so; but the pelvis is somewhat damaged, though one of the pubic bones is in place. The vertebræ of the neck are not in such good order as in the other one.

I do not know whether the naturalists inquired into the probable means of existence of the Solitaire. To one of local experience the merest view of the ground would suggest that they lived in the midst of abundance of food, and that their extinction cannot be ascribed to deficiency of nourishment, nor to human agency, as the population was too sparse, and the place where their remains are now found too remote to be more than occasionally hunted; and it is well established that it is only very lately that many of the caverns in which these remains have been found have been discovered. Neither can it be granted that the bones were washed into the caverns and thus buried in the floors, though doubtless such was the case in some instances, especially in some of those explored by Mr. Slater. The cave which I explored was in a sort of cliff, and the entrance about eight feet above the bed of the ravine, which ultimately became a cavern; and there were no marks whatever of any action of water beyond the filtration from the roof in a few spots. I can only gather therefore that these birds resorted to these caves in considerable numbers and appear to have frequented them, although this hypothesis is opposed to Leguat's statement, as he expressly mentions that the birds were not gregarious, but solitary.

The hypothesis that they got into the caves to avoid fires is equally untenable. Fire could not take place in this coral country, as there is no grass to propagate it, and the trees are very wide apart.

Messrs. Newton's theory of swine having destroyed them is equally, in my view, erroneous; pigs would get nothing to eat, nor water to drink, and would scarcely leave the ravines far away from this spot, where abundance of guava, raspberries, *Colocasia*-roots, and other succulent food in which they delight exist, and where they could (as at present) wallow in the muddy pools.

I can only attribute their apparently sudden and simultaneous disappearance to some terrible hurricane or other disturbing cause which led them to these places for shelter; for they are found in many places where no bird deprived of the faculty of flight, and with any instinct, would resort to, viz. withdrawn into nooks, cran-nies, and fissures whence they could, in many instances, scarcely get

out again. How, under any other theory, can the discovery in similar places of remains of Gulls and Tortoises be explained? The effect of a hurricane such as I have described, is to shake off every fruit, seed and leaf from the trees. The south-western corner of Rodriguez would be peculiarly exposed to its violence, and consequently the animals and birds living on such food would literally die of starvation.

I omitted to mention that I got, both with the mounted bird and the male bird, the stones mentioned by Leguat as existing in the gizzard. In each case they were found on lifting the sternum and in the middle of the ribs. They are basaltic pebbles with rough angles and surfaces, and no stone of similar kind is to be found within about two miles from the caverns. I got four in all, but only two of which I could identify the birds they belonged to.

By last mail, I sent Mr. Edward Newton a specimen of the nearly extinct Rodriguez Parrot\*. It is probably the Blue Parrot of Messrs. Newton's paper, p. 357; and I have seen several of them, though I never could get near one myself.

I hope shortly to hear of and procure a specimen of the long Lizard, called Coulevec, also supposed to be extinct, but which I imagine still exists. If one is still to be got, I am sure of it, as I have offered a good reward.

In Malacology there is a very large and interesting field to explore, though probably most of our Mauritian species are also found there. I got a very handsome collection. As was to be expected, the land-shells are peculiar. Remarks on these subjects, I must defer for the present, as the mail is just starting.

7. List of Land and Freshwater Shells collected by Mr. Osbert Salvin in Guatemala in 1873-74. By Dr. E. von MARTENS, C.M.Z.S.

[Received November 3, 1875.]

1. *GLANDINA FUSIFORMIS*, Reeve, with var.  $\beta$ , Crosse et Fischer.

*Hab.* Coban, Vera Paz.

2. *GLANDINA LIGNARIA*, Reeve (non Crosse et Fischer).

*Hab.* Coban, Vera Paz.

3. *GLANDINA MONILIFERA*, Pfr.

*Hab.* Coban, Vera Paz.

4. *STREPTOSTILA NIGRICANS*, Pfr.

*Hab.* Coban, Vera Paz.

\* *Palaeornis casul*, Newton, Ibis, 1872, p. 33.

5. *STREPTOSTILA DELATTREI*, Pfr.  
*Hab.* Coban, Vera Paz.
6. *STREPTOSTILA BOCOURTI*, Crosse et Fischer.  
*Hab.* Coban, Vera Paz.
7. *EUCALODIUM WALPOLEANUM*, Crosse et Fischer.  
*Hab.* Coban, Vera Paz.
8. *EUCALODIUM DECOLLATUM*, Nyst.  
*Hab.* Coban, Vera Paz.
9. *CYLINDRELLA POLYGYRA*, Pfr.  
*Hab.* Coban, Vera Paz.
10. *MORELETEA EURYOMPHALA*, Pfr.  
*Hab.* Coban, Vera Paz.
11. *HELIX GHIESBREGHTI*, Pfr.  
*Hab.* Coban, Vera Paz.
12. *HELIX EXIMIA*, Pfr.  
*Hab.* Coban, Vera Paz.
13. *HELIX SARGI*, Crosse et Fischer (Journ. Conch. 1872, pl. ix. fig. 2).  
*Hab.* Coban, Vera Paz.
14. *HELIX TRIGONOSTOMA*, Pfr. var.  $\gamma$ , Crosse et Fischer.  
*Hab.* Vicinity of the city of Guatemala.
15. *BULIMULUS ALTERNANS*, Beck.  
*Hab.* Vicinity of the city of Guatemala.
16. *BULIMULUS CASTUS*, Pfr.  
*Hab.* Coban, Vera Paz.
17. *BULIMULUS JONASI*, Pfr.  
*Hab.* Coban, Vera Paz.
18. *BULIMULUS PETENENSIS*, Morclet.  
*Hab.* Vera Paz.
19. *CYCLOTUS DYSONI*, Sow.  
*Hab.* Coban, Vera Paz.
20. *CYCLOPHORUS PONDEROSUS*, Pfr.  
*Hab.* Coban, Vera Paz.
21. *CYCLOPHORUS TEXTURATUS*, Sow.  
*Hab.* Coban, Vera Paz.

## 22. MEGALOMASTOMA (TOMOCYCLOS) SIMULACRUM, Morelet.

*Hab.* Coban, Vera Paz.

## 23. CHONDROPOMA RUBICUNDUM, Morelet.

*Hab.* Coban, Vera Paz.

## 24. HELICINA VERNALIS, Morelet.

*Hab.* Coban, Vera Paz.25. HELICINA ROSTRATA, Morelet (*salvini*, Tristram).*Hab.* Coban, Vera Paz.

## 26. HELICINA AMÆNA, Pfr.

*Hab.* Coban, Vera Paz,

## 27. HELICINA TROSULA, Morelet, var.

*Hab.* Vicinity of the city of Guatemala.

## 28. HELICINA ANOZONA, sp. n.

*Testa globosa, spiratim subtiliter striata, nitida, carneo-flavescens, zona suturali pallide flava insignis; spira conoidea, acutiuscula; anfractibus 5, convexiusculis, ultimus subinflatus, antice non descendens; apertura parum obliqua, late semiovalis; columella brevis, subrecta, tuberculo terminata; peristoma incrassatum, latiusculum, reflexum, læte luteum; callus basalıs circumscriptus, mediocris, crassus.*

Diam. maj. 8, min. 7, alt. 7, apert. alt. 5, lat.  $3\frac{1}{2}$  millim.*Hab.* Vicinity of Coban. Central America (*Salvin*).

Similar to *H. fulva*, D'Orb, from Bolivia, and to *H. rotunda*, D'Orb, from the West Indies; the first is more flattened, of larger size, and differently coloured; the latter has no spiral sculpture, and a much thinner peristome.

## 29. SCHASICHILA PANNUCEA, Morelet.

*Hab.* Coban, Vera Paz.*Freshwater Shells.*

## 30. PHYSA NITENS, Phil.

From a small stream running into the lake of Dueñas above Santiago, Zamora. 31st Aug. 1873.

## 31. PLANORBIS TENUIS, Phil.

*Hab.* Dueñas.

## 32. AMPULLARIA FASCIATA (Lam.), Reeve.

*Hab.* Coban, Vera Paz.

8. On the Eared Seals of the Islands of St. Paul and Amsterdam, with a Description of the Fur-Seal of New Zealand, and an attempt to distinguish and rearrange the New-Zealand *Otariidæ*. By J. W. CLARK, F.Z.S.

[Received December 6, 1875].

(Plates LXX.—LXXII.)

When I began this paper I expected that it would amount to no more than a description of the four skulls from St. Paul's Island which I exhibit to night, with a few notes on the stuffed specimens from the same locality preserved in the Museum of the Jardin des Plantes, Paris, where, thanks to the kindness of my friends Professor Gervais and Professor Milne-Edwards, I was allowed, last autumn, to study the specimens that had been lately acquired. A fortnight ago, however, my friend Dr. Hector was so good as to present to the Cambridge Museum a young Fur-Seal of New Zealand preserved in spirit, and to lend me, with the concurrence of Dr. Günther, two adult skulls of the same species, male and female. He also, with great generosity, put into my hands the notes and measurements he had taken when the animals were captured; so that, thanks to him, I am able to lay before the Society much new and valuable information respecting the southern *Otariidæ*, with which we are still so imperfectly acquainted.

The specimens I have to exhibit are:—four skulls from the Island of St. Paul or Amsterdam, I am unable to say which; of the Fur-Seal of New Zealand, a young female in spirit, and two adult skulls, of one of which the snout has fortunately been preserved; and a young skull from Campbell Island lent me by Professor Gervais.

I propose to preface my description of these by a collection of the notices of "Seals" that are profusely scattered through the early voyages of exploration to the South Sea and New Zealand, in the hope of clearing up to a certain degree the difficult question of the number and synonymy of the species still existing on the Australian coasts, using the term "Australian" to designate Australia proper, New Zealand, Tasmania, and the adjacent islands. These notices are peculiarly valuable for my present subject, as the destruction of Seals has been going on steadily since the first discovery of the country.

#### HISTORICAL EVIDENCE.

##### I. *Islands of St. Paul and Amsterdam.*

These are two volcanic islands in lat.  $37^{\circ} 52'$  S., long.  $77^{\circ} 35'$  E., discovered by one Vlaming, a Dutchman, in 1697. It would appear that the most southern of the two is now called St. Paul's; but the islands have changed names more than once\*. They are nearly equidistant from the Cape of Good Hope and Australia, and lie only

\* See Vancouver's Voyage, 4to, London, 1798, i. p. 26.



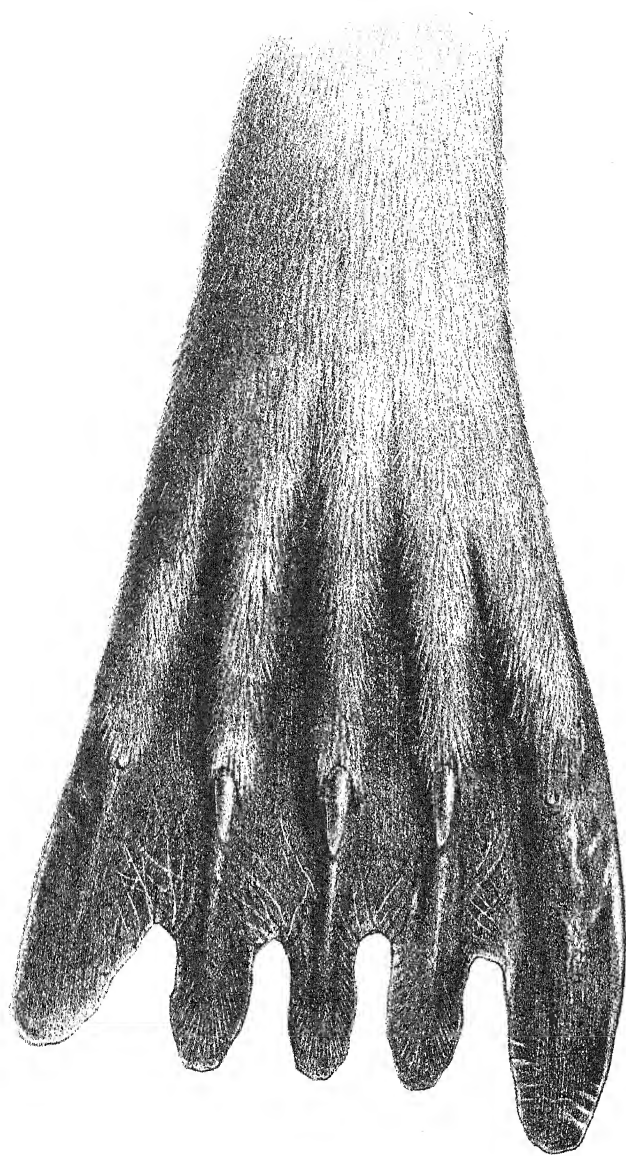
J. Smith del.

M & N Hanhart imp.

RIGHT MANUS OF OTARIA FORSTERI.





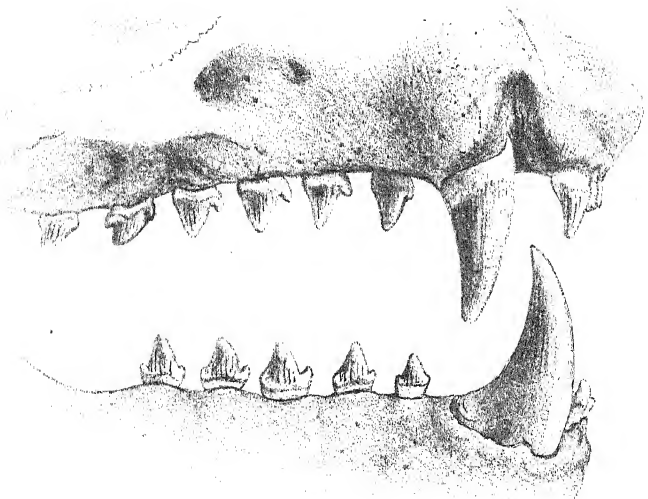


J. Smith del.

M. & N. Hanhart imp.

RIGHT PES OF OTARIA FORSTERI.





J. Smith del.

M. & N. Hanhart imp.

DENTITION OF OTARIA FORSTERI.



a little to the north of the usual course of vessels bound to the latter country. In consequence they have, no doubt, been frequently visited; and in most voyages some reference, usually a slight one, is made to them\*; but few detailed accounts are to be met with. In the very interesting narrative of Captain Cox's voyage, however, the following description occurs:—

“At half past one in the afternoon of the 29th [May, 1789], we saw the Island of Amsterdam, bearing north-east by east; and at half past eight at night came to an anchor . . . . As in all probability the Mercury is the first English vessel that ever anchored at this Island, a particular description of it may be interesting to the curious. . . . .

“On our first landing, we found the shore covered with such a multitude of Seals, that we were obliged to disperse them before we got out of the boat; there were besides several Sea-lions or wolves, of a most enormous size and tremendous appearance, one of them that we measured being twenty-one feet in length, and nearly as much in circumference. These animals are of a dirty white, or stone colour, very inoffensive, and so unwieldy and lazy as not to move at the approach of any one, unless attacked; when they retreated towards the sea backwards, with their mouths open and shaking their heads, but without making any noise. Some of them were very difficult to kill; for notwithstanding they had received several musket-balls in their heads and down their throats, and were wounded in different parts of the body with half-pikes, so that the blood came from them in torrents, yet they found means to escape into the sea; one of them, however, was killed at the first shot with a single ball, which, I suppose, penetrated the brain. The Sea-lions greatly resemble the Seal in shape, and, like them, are furnished with four feet or fins; the two hindermost of which they sometimes carry erect so as to resemble a tail.

\* \* \* \* \*

“It being very clear early in the morning, we plainly discerned the Island of St. Paul's from the quarter-deck, bearing north north-east, distant seventeen leagues.

\* \* \* \* \*

“We procured here a thousand Seal-skins of a very superior quality while we remained at the Island of Amsterdam, besides several casks of good oil for our binnacles and other purposes”†.

Cox's Voyage was not published till 1791; but attention had been already drawn by others to the profit that might be derived from these islands, as is shown by a letter from the master of the ‘*Britannia*,’ the first vessel that ever made a whaling-cruise in the South Sea, to his owners the Messrs Enderby, dated Nov. 29, 1791, narrating an attempt he had made “to run down to it [Amsterdam

\* As in Flinders's ‘*Voyage to Terra Australis*,’ 4to, London, 1815, i. p. 46.

† ‘*Observations &c.*, made during a Voyage to the Islands of Teneriffe, Amsterdam, &c., in the brig Mercury, commanded by Henry Cox, Esq., by Lieut. George Mortimer, 4to, London, 1791, p. 10.

Island] to discover whether the sealing business might not have been carried on there"\*. .

In the same year they were sighted by D'Entrecasteaux, who commanded the first expedition sent out to search for La Pérouse. One of the islands was on fire, caused, it was supposed, by sealers, "as an American vessel had landed a party of men to obtain oil from the seals, which are very numerous there." The expedition did not land; but they "saw plenty of seals swimming among masses of seaweed, about three-quarters of a mile from the coast"†.

In February 1773, the vessels conveying Lord Macartney to China touched there. They found five men on the island, three French and two English, who were engaged in collecting Seal-skins, 25,000 of which they were bound to supply in a given time for the Canton market. "One of them, an Englishman, had been there for some time on a former adventure."

"The seals," says the narrator‡, "whose skins are thus an article of commerce, are found here in greater numbers in the summer than in the winter, when they generally keep in deep water, and under the weeds, which shelter them from the inclemency of the weather. In the summer months they come ashore, sometimes in droves of eight hundred or a thousand at a time, out of which about a hundred are destroyed, that number being as many as five men can skin and peg down to dry in the course of a day. Little of the oil which these animals might furnish is collected, for want of casks to put it in; part of the best is boiled, and serves those people instead of butter. The seal of Amsterdam is the *Phoca ursina* of Linnaeus. The female weighs, usually, from seventy to one hundred and twenty pounds, and is from three to five feet in length; but the male is considerably larger. In general they are not shy; sometimes they plunge into the water instantly upon any one's approach, but at other times remain steadily on the rocks, bark, and rear themselves up in a menacing posture; but the blow of a stick upon the nose seemed sufficient to dispatch them. Most of those which come ashore are females, in the proportion of more than thirty to one male. Whether, in those animals, nature has fixed on such an apparent disproportion between the two sexes, or whether, while the females have occasion to seek the shore, the males continue in the deep, has not hitherto been ascertained by any observations here. In the winter season great numbers of Sea-lions (*Phocæ leonine*), some eighteen feet long, crawl out of the sea upon the causeway, making a prodigious howling noise . . . It is thought that both Seals and Sea-lions are somewhat less numerous here of late, since the place has been frequented by vessels for the purpose of getting their skins."

H.M.S. *Megæra* was run ashore on St. Paul's, June 19, 1871.

\* 'An Historical Journal of the Transactions at Port Jackson, &c.,' by John Hunter, Esq., 4to, London, 1793, p. 537.

† 'Relation du voyage à la recherche de La Pérouse, pendant les années 1791-2, par le Citoyen Labillardière, un des Naturalistes de l'Expedition' (2 vols. 4to, Paris, 1801), vol. i. p. 110.

‡ 'An authentic account of an Embassy from the King of Great Britain to the Emperor of China,' by Sir G. Staunton (2 vols. 4to, London, 1797), i. p. 210.

It was found to be inhabited by three French Malay fishermen, whose employers resided at Bourbon. They were visited every three or four months, and the fish they had caught and salted taken away. A view of the island will be found in the 'Illustrated London News' for August 19, 1871; but I cannot learn that any notes were taken of the zoology.

St. Paul's was selected by the French Government as a station for observation of the transit of Venus on Dec. 9, 1874. A good geologist, M. Charles Vélain, Attaché à la Faculté des Sciences, Paris, was sent out with the expedition. He has given a most interesting description of the geological conformation of both the islands. St. Paul's is a vast crater, like that of Mauna-Loa in Hawaii, one side of which has been broken down; and the sea rushing in, has formed a splendid natural harbour, with, however, rather a dangerous bar across the mouth. It is interesting to note that at the date of Lord Macartney's visit this bar stretched across the harbour so much above high-water mark as to be termed a "causeway," and the volcanic forces were evidently much more active than they are at present: smoke was seen to issue from many parts of the island.

Amsterdam Island, which M. Vélain believes to have been almost entirely unexplored up to the present time, on account of the dense vegetation with which it is covered, is volcanic, like St. Paul's, but of a totally different shape, being a square mountain mass with precipitous sides, from 1500 to 1800 feet high. "Otarias (*Otaria delalandei*)," he says, "live at St. Paul's Island and, above all, at Amsterdam Island in considerable herds" \*.

## II. *New Zealand, Australia, and the adjacent Islands.*

Captain Cook, in his first voyage, off Cape Egmont, on the east coast of the North Island of New Zealand (Jan. 15, 1770), "saw a Sea-lion rise twice near the shore, the head of which exactly resembled that of the male which has been described in the account of Lord Anson's voyage" †.

This may be supplemented by his account of what he saw at the same place on his second visit, June 1773:—

"In our excursion to the East, we met with the largest Seal I had ever seen. It was swimming on the surface of the water, and suffered us to come near enough to fire at it; but without effect; for, after a chase of near an hour, we were obliged to leave it. By the size of this animal it probably was a Sea-lioness. It certainly bore much resemblance to the drawing in Lord Anson's Voyage; our seeing a Sea-lion when we entered this Sound in my former voyage increaseth the probability; and I am of opinion, they have their abode on some of the rocks, which lie in the Strait, or off Admiralty Bay" ‡.

\* "Les Otaries (*Otaria delalandei*) vivent à Saint-Paul, et surtout à Amsterdam en troupeaux nombreux" (Comptes Rendus de l'Académie, 1875, p. 998).

† Hawkesworth, 'An Account of the Voyages &c.,' vol. ii. p. 385.

‡ Voyage towards the South Pole and round the world, Fourth Edition, vol. i. p. 124.



On the same voyage, immediately after casting anchor in Dusky Bay (at the south-east corner of the Middle [South] Island of New Zealand) on March 26, 1773, he records the presence of Seals on some rocks in the harbour, laid down in his chart as "Seal Isles."

"Some of the gentlemen killed a seal (out of many that were upon a rock), which made us a fresh meal" \*.

April 2.—"In our way, we touched at the seal-rock, and killed three seals, one of which afforded us much sport" (p. 73).

May 10.—"Went out in the boats to the rocks, which lie at this entrance of the bay, to kill seals. The weather was rather unfavourable for this sport, and the sea ran high, so as to make landing difficult; we, however, killed ten; but could only wait to bring away five, with which we returned on board" (p. 91).

Again, "The only amphibious animals are seals. These are to be found in great numbers about this bay, on the small rocks and isles near the sea-coast" (p. 96).

The explorations of Captain Cook were succeeded in the years 1795-99 by those of George Bass, surgeon of the 'Reliance,' and Matthew Flinders, then a midshipman. They surveyed the coast of Australia south of Port Jackson, and discovered the strait separating Australia from Van Dieman's Land,—sometimes independently, and sometimes together.

Bass found the rocks of Cape-Barren Island, off the north coast of Tasmania, "covered with fur-seals of great beauty. This species of seal seemed to approach nearest to that named by naturalists the Falkland-Island Seal" †.

Again, of one of the islands off the "Patriarchs," not far distant from the above, after describing the land portioned out among the birds, we read, "the rest was appropriated to the seals, who seemed to be the lords of the domain. Mr. Bass remarked with surprise, that though the principal herd scampered off like sheep, as is usual on the first approach, yet the males, who possessed a rock to themselves, where they sat surrounded by their numerous wives and progeny, on his drawing near them, hobbled up with a menacing roar, and fairly commenced the attack, while the wives seemed to rest their security upon the superior courage and address of their lord; for instead of retreating into the water in the utmost consternation, they only raised themselves upon their fore fins, as if ready for march, keeping their eye upon him, and watching the movements of his enemy.

\* \* \* \* \*

"The seal appeared to branch off into various species. He did not recollect to have seen them precisely alike upon any two islands in the Strait. Most of them were of that kind called by the sealers Hair-seals; but they differed in the shape of the body, or of the head, the situation of the fore fins, the colour, and very commonly in the voice, as if each island spoke a peculiar language" ‡.

\* Voyage towards the South Pole, &c., 4th ed., vol. i. p. 68.

† 'An account of the English Colony in New South Wales, &c.,' by Lieut. Col. Collins (2 vols. 4to, London, 1802), i. p. 158.

‡ *Ibid.* p. 192.

Flinders\* gives a vast number of notices respecting the Seals he found on the different islands in the Strait. He seems to have taken a naturalist's and not a speculator's interest in them.

Feb. 16, 1798.—Large Hair-Seals were met with on Battery Island—a rock in the channel between Cape-Barren Island and the southern islands. The rocks of Clarke's Island “were also frequented by hair-seals; and some of them (the old males) were of an enormous size and extraordinary power. I levelled my gun at one, which was sitting on the top of a rock with his nose extended up towards the sun, and struck him with three musket-balls. He rolled over, and plunged into the water; but in less than half an hour had taken his former station and attitude. On firing again, a stream of blood spouted forth from his breast to some yards distance, and he fell back senseless. On examination, the six balls were found lodged in his breast; and one, which had occasioned his death, had pierced the heart: his weight was equal to that of a common ox” (vol. i. p. cxxviii).

On Cone Point “the number of seals exceeded every thing we had, any of us, before witnessed; and they were smaller, and of a different species from those which frequented Armstrong's Channel. Instead of the bull-dog nose, and thinly set, sandy hair, these had sharp-pointed noses, and the general colour of the hair approached to a black: but the tips were of a silver-grey, and underneath was a fine, whitish, thick fur. The commotion excited by our presence, in this assemblage of several thousand timid animals, was very interesting to me, who knew little of their manners. The young cubs huddled together in the holes of the rocks, and moaned piteously; those more advanced scampered and rolled down to the water, with their mothers; whilst some of the old males stood up in defence of their families, until the terror of the sailors' bludgeons became too strong to be resisted. Those who have seen a farm-yard, well stocked with pigs, calves, sheep, oxen, and with two or three litters of puppies, with their mothers, in it, and have heard them all in tumult together, may form a good idea of the confused noise of the seals at Cone Point. The sailors killed as many of these harmless and not unamiable creatures as they were able to skin during the time necessary for me to take the requisite angles; and we then left the poor affrighted multitude to recover from the effect of our inauspicious visit” (p. cxxix.).

“The hair-seal appears to frequent the sheltered beaches, points, and rocks: whilst the rocks and rocky points exposed to the buffettings of the waves are preferred by the handsomer and superior species, which never condescends to the effeminacy of a beach. A point or island will not be greatly resorted to by these animals, unless it slope gradually to the water, and the shore be, as we term it, steep to. This is the case with the islet lying off Cape Barren,

\* A Voyage to Terra Australis, in the years 1801, 1802, and 1803, by Matthew Flinders (2 vols. 4to, London, 1814). The introduction, pagged in Roman numerals, contains an excellent account of the previous explorations of himself and others.

and with Cone Point: with parts of the Passage Isles, and the south end of Clarke's Island; and at these places only did I see fur-seals in any number" (p. cxxxiii.).

Waterhouse Island (on the north coast of Tasmania, west of Furneaux's Island) "was almost covered with sea-birds and hair-seals" (p. cli.).

At Three-Hummock Island (at the west extremity of the Strait) Mr. Bass landed. "He had been obliged to fight his way up the cliffs of the island with the seals, and when arrived at the top, to make a road with his clubs among the albatrosses. . . . The seals were of the usual size, and bore a reddish fur, much inferior in quality to that of the seals at Furneaux's Island" (p. clxxii.).

In the "Recherche Archipelago" (south-west coast of Australia), says Flinders on his voyage in 1801, "all the islands seem to be more or less frequented by seals; but I think not in numbers sufficient to make a speculation from Europe advisable on their account; certainly not for the China market, the seals being mostly of the hair kind, and the fur of such others as were seen was red and coarse" (i. p. 92).

On Investigators Islands "the beaches were frequented by seals of the hair kind. A family of them, consisting of a male, four or five females, and as many cubs, was lying asleep at every two or three hundred yards. Their security was such, that I approached several of these families very closely, and retired without disturbing their domestic tranquillity or being perceived by them" (p. 125).

Kangaroo Island abounded with Kangaroos and Seals. "They seemed to dwell amicably together. It not unfrequently happened that the report of a gun fired at a kangaroo near the beach, brought out two or three bellowing seals from under bushes considerably further from the water side. The seal, indeed, seemed to be much the most discerning animal of the two; for its actions bespoke a knowledge of our not being kangaroos, whereas the kangaroo not unfrequently appeared to consider us to be seals" (p. 172).

The explorations of Péron, who visited Australia at the same time as Flinders, have left us several valuable notices on the Seals and Otarias observed by him. It is much to be regretted that his memoir of the family never appeared, and that his MSS. have been, so far as I know, lost sight of\*.

It is beside my present purpose to do more than refer to his very remarkable account of the Sea-elephants that he found on King Island in Bass's Strait, and nowhere else. Flinders had already remarked an animal there which may, I feel sure, be referred to this species†.

On visiting Kangaroo Island (called by the French *Isle Decrès*) he found "a new species of the genus *Otaria* (*O. cinerea*, N.), which attains the length of 9 to 10 feet. The hair of this animal

\* After establishing the genus *Otaria* for "les Phocacés à auricules," he speaks of "un travail très-étendu que je prépare sur la famille" ("Voyage de Découvertes aux Terres Australes. . . pendant les années 1800-1804," par Péron et Freycinet [3 vol. 4to, Paris, 1816], ii. p. 37).

† L. c. i. p. 206; Péron, l. c. chap. xxiii.

is very short, hard, and coarse; but its leather is thick and strong, and the oil prepared from its fat is as good as it is abundant. For both these reasons it would be highly advantageous to fish this animal, as also some other species of Seals of smaller size that are found together with the former in great numbers on these coasts, and which possess fur of good quality" (ii. p. 77).

At an island called by the French Isle Eugène, in the Nuyts Archipelago, and which is, I believe, identical with the St.-Francis Island of Flinders and the English maps, he finds a new species "of the genus I have thought it right to establish under the name of *Otaria*. They attain the length of 8 to 9 feet, and are especially distinguished by a large white spot on the middle and upper surface of the neck: from this character I have described this new seal under the name of *Otaria albicollis*, N. Individuals of this beautiful species have their fore limbs closer together than the other amphibians (!) of the same family; they are moreover far more active and less timid than the others" \*.

Captain Turnbull, writing in 1810†, mentions that "when the sealing flagged in some degree at Bass's Straits, they [the colonists] turned their attention to New Zealand, where the seals were known to abound. Every bay, creek, and river was examined by them; and the fruit of their labour most amply recompensed them" (p. 505). . . "The intercourse between the colony of New South Wales and the Fejee Islands to the northward has been extremely active of late years. Several vessels fitted out at that colony obtained cargoes there amounting to 46,000 seal-skins" (p. 509) . . . "In 1811 some resolute adventurers, in pursuit of new objects, penetrated as far as lat. 54° 45' S. and long 159° 42' E., where they discovered an island. . . which they named Macquarrie Island . . . . Some time previous to this another island had been discovered in the latitude of 52° 41' S., long. 169° E., which . . . . the discoverer named Campbell's Island. The first of these adventurers, and their immediate successors who arrived at Macquarrie Island, killed not less than 80,000 seals" (p. 515).

The French expedition sent under Dumont D'Urville in the 'Astrolabe,' between the years 1826 and 1829, to the South Seas, coasted the south of Australia. Two species of *Otaria* have been described by the naturalists of the voyage‡, *Otaria cinerea* and *O. australis*.

As regards the Seals of the Aucklands I must refer to my own paper, P. Z. S. 1873, p. 750.

Lastly, the French Government having determined to send an expedition to Campbell Island§ to observe the transit of Venus, an excellent naturalist, M. Filhol, was selected to accompany it. He

\* L. c. p. 118. "Ont les pieds antérieurs moins éloignés de la poitrine que la plupart des autres amphibiens de la même famille."

† 'A Voyage round the World in the years 1800-1804,' by John Turnbull. Second edit. 4to, London, 1813, pp. 505 *et. seq.*

‡ Zoologie, vol. i. pp. 89-99.

§ For an account of Campbell Island see Sir John Ross's Antarctic Voyage, i. p. 154.

has sent home a large series of skulls and skeletons of *Otaria hookeri*, ♀, ♂, and young, together with a series of *Stenorhynchus leptonyx*, which I was allowed to examine at Paris last September. One of the young skulls I exhibit to-night. I think there is no doubt, after comparison of it with a young skull of *Otaria hookeri* from Auckland Island, lent me by Dr. Hector, that it is referable to that species, which varies exceedingly, as I have already shown, according to age and sex.

From these accounts I estimate that the following species exist, or once existed:—

*Amsterdam Island and St. Paul's Island.*

1. A Sea-elephant, called "Sea-lion" by Captain Cox and Sir G. Staunton, a name universally given in the old voyages to that animal, as I have shown elsewhere\*.

2. An *Otaria* with abundant fur.

*New Zealand and Australia.*

1. A "Sea-lion," seen off Cape Egmont by Cook on two occasions, and remarked by him to resemble the Sea-lion of Anson's voyage. This, therefore, I take to have been a Sea-elephant, though Péron found them, only 32 years later, restricted to King Island in Bass's Straits.

2. One or more species of Hair-Seal, probably of the genus *Stenorhynchus*, which is still abundant on the New-Zealand coast, and of which it would appear that there is more than one species †.

3. The *Otaria* of Dusky Bay, described by Forster, and which has since been recognized as "the Fur-seal" *par excellence* of New Zealand. This is probably the same species as that with "sharp-pointed nose, black hair, and fine whitish fur" seen by Bass and Flinders on Cape-Barren Island and elsewhere, between Australia and Van Diemen's Land.

4. An *Otaria* observed by Flinders and Péron on Kangaroo Island, and called by the latter *O. cinerea*. To Péron's account may be added Flinders's remark that it "bore a reddish fur."

5. An *Otaria* called *O. albicollis*, from the white patch on the neck.

*Macquarrie Island.*

A Fur-Seal, of which we have as yet received no specimens.

*Campbell Island.*

1. A Fur-Seal, apparently.

2. *Otaria hookeri*,

3. *Stenorhynchus leptonyx*, } as determined by the French.

*Auckland Island.*

1. *Otaria hookeri*.

2. A Fur-Seal.

3. *Stenorhynchus leptonyx*.

\* 'Nature,' Sept. 2, 1875, p. 367, and 'Contemporary Review,' Dec. 1, 1875.

† Trans. New-Zealand Inst. ii. p. 29.

I now proceed to attempt to reconcile these notices with the recorded species: and I will take first the Fur-Seal of New Zealand, the true name for which I shall show to be *Otaria forsteri*.

Dr. Hector's notes (taken when the specimens exhibited were killed) are as follows:—

1874. "On January 6, when on board the New-Zealand Government gun-boat 'Lima,' I got eleven specimens, young and old, on the group of rocks called 'the Steeples,' off Cape Foulwind, west coast of Nelson. None of the specimens are very old; and the females are suckling young of a few weeks age. Two males and two females, supposed to be in the third year, were selected for measurement and preservation, and also several young ones. The skeleton of one of the males is now in the British Museum, the skull and skin of one female, and the nose of specimen A. Two young specimens, also in spirit, and one stuffed and set up (but this latter was obtained at 'the Snares' \*) have also been placed in the British Museum."

A. Male (fig. 1, p. 660). Skeleton in British Museum.

	in.	lin.
"Total length .....	83	0
Length of snout from eye .....	5	5
"    "    mouth .....	3	0
"    of gape .....	3	0
"    from eye to base of ear-conch .....	4	0
"    from ear-conch .....	1	8
Width between eyes .....	4	0
Girth at shoulder .....	68	0
"    vent .....	36	0
Distance of commencement of anterior flipper from snout .....	31	0
Length of flippers .....	20	0
Width .....	8	8
Distance of generative organs from snout .....	56	0
Length of hind flippers .....	15	0
Width .....	8	0

"Snout conical, produced, nose overhanging the nostrils, which are inferior, valvular, and separated by a deep sulcus. About 20 white bristles.

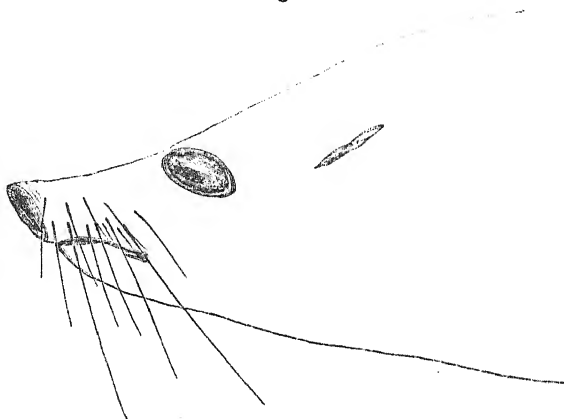
"Colour on back—long hairs black and white, mixed with lighter brown under-fur. Beneath, hair black, short, with a dark brown under-fur. Nose and flippers naked and jet-black.

"Anterior flippers with first finger longest: five fingers, all with deeply immersed rudimentary nails; internal finger half the length of the external. Posterior flippers, external finger slightly the longest, all produced; three middle digits with strong black nails

\* A cluster of seven craggy islands, south-west of New Zealand, in lat. 48° 3', long. 166° 20', discovered in 1791 by Vancouver, and so named, "as being very likely to draw the unguarded mariner into alarming difficulties" (Vancouver's Voyage, i. p. 71: 4to, London, 1798).

4 inches from the tips of the skin-flaps. The external and internal with only rudimentary nails."

Fig. 1.



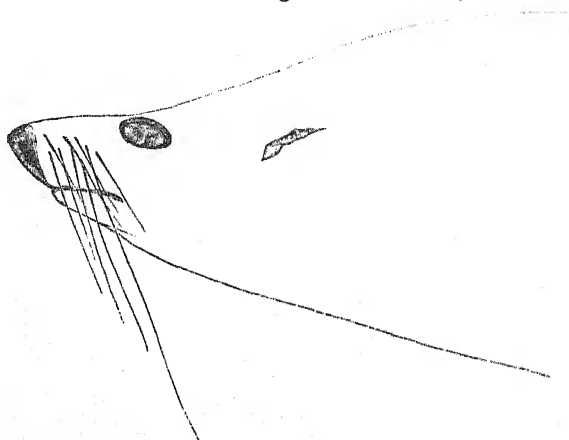
Snout of *Otaria forsteri* ♂. From a sketch by Dr. Hector of specimen A.

B. Female (fig. 2). Skin and skull in British Museum.

	in.	lin.
"Total length .....	77	0
Girth at flippers .....	48	0
Length of snout.....	4	5

"Whisker-bristles some black and some white. In both sexes the length of the cartilaginous snout is 2 inches beyond the symphysial knob."

Fig. 2.



Snout of *Otaria forsteri* ♀. From a sketch by Dr. Hector of specimen B.

C. Male. Skin in the Colonial Museum, New Zealand.

"Total length 78 inches.

"Whiskers all white."

D. Female. Skeleton in Colonial Museum, New Zealand.

"Total length 62 inches.

"Hair on rump very short, brownish beneath, whisker-bristles all black but one."

Dr. Hector had previously described specimens taken at Milford Sound, west coast of Otago, in February 1871; but as the descriptions and measurements correspond with the notes I have just read, I need not do more than refer to the paper, which is to be found in the 'Transactions of the New-Zealand Institute,' vol. iv. p. 196, except to remark that he notes a slight difference in the colour of the fur:—"tips of the whole, as laid open by the hand, black; middle parts chestnut-brown, and pure white at base."

I now proceed to describe the specimens exhibited.

The animal in the flesh is a young female.

	inches.
Length from tip of nose to tip of hind feet . . . . .	30
" " " tip of tail . . . . .	25
" of tail . . . . .	1
" from tip of nose to edge of anterior pectoral limb, in a straight line . . . . .	11
" from tip of nose to ear . . . . .	4
Pectoral limb—length from the shoulder-joint to the furthest extremity of the manus, measured along the outer edge . . . . .	10
Pelvic limb—length from root of tail to most distant portion of free flipper . . . . .	6

If we compare these measurements with those of *Otaria jubata*, as given by Dr. Murie (Tr. Z. S. vol. vii. p. 530), or even glance at any of the figures of that animal, it will be seen that the proportions are very different. In that the distance from the muzzle to the root of the tail is 64 inches, and from the same part to the anterior edge of the pectoral limb 23 inches. Consequently the limb is set on at about one third of the distance from the head to the tail, while in this animal it is nearly in the middle of the body. The "manus" preserves the same proportions to the body as in *O. jubata*; but the "pes" is exactly one fifth of the whole length, whereas in the former it is one fourth. It must of course be remembered that the specimen from New Zealand is young; still these differences are almost too great to be accounted for by age alone.

The hair all over the body is coarse, about three quarters of an inch long on the hind quarters, one inch long on the back of the neck, and half an inch long on the top of the head. On the under surface of the body it is three quarters of an inch long on the throat, and half an inch long on the hind quarters. The general colour is black, all over the head and upper parts of the body. Individual hairs, when pulled out, are seen to be of a pale yellow for



the first half of their length, and to have a yellowish tip. The yellow extends further down the hair on the nape of the neck than elsewhere, giving a brindled appearance to that part. On the under surface of the body the hair is reddish brown. At the base of the hair is a dense growth of short delicate fur, of the same colour as the base of the hairs.

In a second specimen, rather older, which has been stuffed and set up in the British Museum, there are slight differences of colouring observable. The brindled appearance of the hair, caused by the hairs being tipped with white, extends all over the back and sides. The reddish brown extends over the underside of the body, and up the chest, where it gradually shades off into a pale chestnut. A space above and behind the mouth, and round the ear, is pale yellow, and there is a patch of dark grey beneath the eye. Ears light brown, black within. Fur on hands and feet dark brown, lighter near the body. The dark brown is shot with bright bay on the feet; and there is a dash of the same, edged with yellow, behind the hands. Shorter whiskers black, hinder and longer ones white.

The "manus" (Plate LXX.) is of the form with which we are familiar in other Otaries; and the naked portion bears the same relation to that covered with hairs as in *Otaria jubata* (l. c. pl. 67). The inner edge, however, is very different. There are only three rounded projections of cartilage, corresponding to digits I. II. III.; and in the interspaces of digits I. and II., and II. and III., there is a second, less prominent projection. Beyond digit III. the limb is bounded only by a wavy edge. The movable portions of the digits and the intervening cartilages are much striated and folded. The palmar surface is puckered into large folds, which are crossed by smaller ones, so as to present a number of lozenge-shaped elevations, more or less regular. At the proximal end, these folds are minutely striated with sinuous cuticular elevations.

There are indications of nails on the first four digits; on the last the nail is represented by a minute depression, hardly bigger than a pin's point.

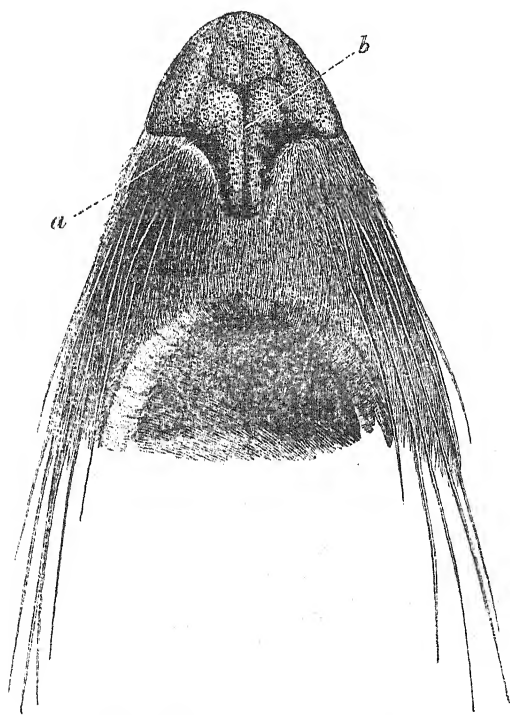
The "pes" (Plate LXXI.) has its upper surface covered with hair, which extends down the back of each digit quite to the nails, the intervening spaces and the terminal cartilages being quite bare. The "pollex" is closely united to the next digit by the intervening cartilage; between the others the cartilage is very elastic, and admits of considerable movement. The under surface, like that of the hand, is broken into irregular folds, and is similarly striated at its proximal end. The three middle digits have nails  $\frac{3}{8}$  of an inch long. These are quite rudimentary on the first and fifth. The nails fail to reach the free edge of the cartilage by about their own length.

The distance between the end of the nails on the "pes" and the free edge of the cartilages varies, no doubt, in each species. In *O. ursina*, to judge from Allen's figure (Harvard Bulletin, ii. plate ii. figs. 11 & 12) the distance is 5 inches; in *O. stelleri* (*ibid.* plate i. figs. 6 & 7) it is barely 1 inch. In the "manus" of *O. ursina* only the first two digits are marked by projections in the cartilage; and even

these are of no great size; in *O. stelleri* each is indicated only by a slight bulging-out.

*Snout, nose, and whiskers* (fig. 3, p. 663, and fig. 4, p. 664).—Of this part I have fortunately been able to examine the specimen referred to in Dr. Hector's notes, taken from the male, A.

Fig. 3.



*Otaria forsteri* ♀, nose, seen from beneath.

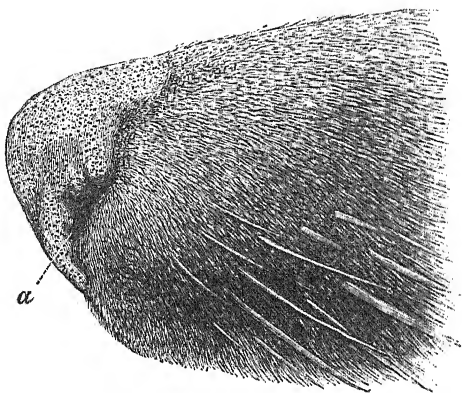
*a*, nostril; *b*, median sulcus.

The snout, as appears from Dr. Hector's sketches (figs. 1 and 2) and from the figures drawn from the specimen I am describing (figs. 3 and 4), tapers suddenly somewhat like that of a pig, and is obliquely truncated, with the nostrils on the sloping surface, which is about 3 inches long from the tip of the nose to the edge of the upper lip. The whole of this, together with a considerable space on the upper surface and sides of the snout, is covered with a dark grey epiderm, said to be jet-black during life, beset with minute bristly hairs.

Above, the bare portion of the snout is V-shaped, half an inch long from before backwards in the centre, and about one inch and three quarters long at the sides. The terminal edge is clearly de-

finer; but for some distance behind it the hairs are not more than one eighth of an inch long, and closely adpressed. Below, the bare portion is T-shaped, about  $2\frac{1}{4}$  inches long, and  $1\frac{3}{4}$  inch broad at its widest part. The nostrils (figs. 3 and 4, *a*) are separated by a space  $1\frac{1}{2}$  inch long by  $\frac{3}{4}$  inch broad above, deeply sulcated by a median furrow (fig. 3, *b*). The skin to the right and left of this is marked by delicate striæ, crossing each other in different directions. The

Fig. 4.



*Otaria forsteri* ♀, nose, seen in profile.  
*a*, nostril.

nostrils are vertical at first, and then diverge at almost a right angle from their former direction. They are not, as might have been expected, hollowed out in the bare portion of the snout, but are external to it; and their outer side is covered with short hairs, which extend for some distance within their cavity.

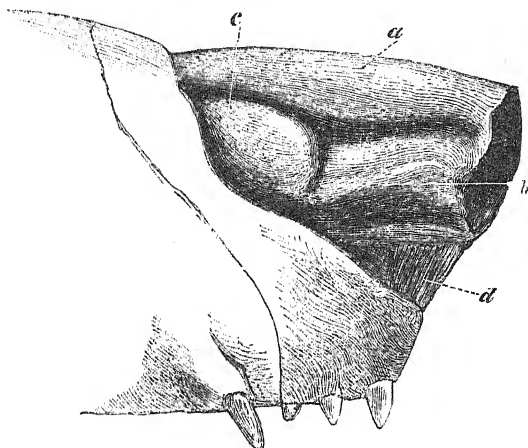
On dissecting off the skin, a remarkable disposition of the nasal cartilages is seen. These I have been able to examine only in the young skull (fig. 5, p. 665).

The "septum nasi" is strong, and apparently immovable. On each side of it, the cartilage which forms the side of the nose is reflected into a fold (fig. 5, *a*), wider in the centre than it is at each end. This fold, which is thin and loose, appears to be easily capable of dilatation, and to disappear completely when the nostrils are fully expanded. Below this there is a second, but much smaller fold (fig. 5, *b*), extending for only half the distance along the "septum;" and behind it, close under the præmaxilla, there is a further expansion into a sort of "bulla," quite isolated from the two folds above described, and apparently incapable of dilatation (fig. 5, *c*). It opens independently by a narrow opening into the nasal cavity. This system of cartilages is kept in position by a ligament (fig. 5, *d*) attached to the bony, peg-like prolongation of the præmaxilla at its symphysis.

In the skull of this specimen, 5 inches in length, the cartilages are

about  $1\frac{1}{4}$  inch long, allowing for the part cut off and left in the skin. In an adult, therefore, their length would be rather more than two inches.

Fig. 5.



*Otaria forsteri* ♀, nasal cartilage, slightly magnified.

a, b, c, folds of the nasal cartilage; d, ligament.

The whiskers are disposed in 5 rows, extending backwards from the nose, with a few straggling hairs between the lip and the first row. There are 4 bristles in each row, so arranged that a bristle in any given row is set opposite to the interval between two bristles in the next. Those of the hind rows are much the longest. In the adult male the same arrangement obtains, as far as I can make out; but several hairs have fallen out. They are stout, flattened, white bristles. The longest measures 8 inches.

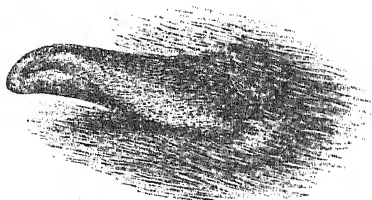
The ears are  $1\frac{1}{8}$  inch long (fig. 6), slender in form, and recurved at the tips. Their great length in proportion to the body will be at once observed.

	Length.	Width.
Skull of A .....	9	$5\frac{3}{4}$
„ B .....	9	$5\frac{1}{2}$

Teeth, in both specimens, I.  $\frac{3-3}{2-2}$ , C.  $\frac{1-1}{1-1}$ , M.  $\frac{6-6}{5-5}$ , = 36. In the upper jaw, the molars (Plate LXXII. fig. 1) are small, conical, sharply pointed, with a small anterior cusp, which increases in size progressively from the first to the fourth. The fifth molar is much recurved, and consists of a large anterior lobe with a very small posterior one. The last molar is simple, and recurved like the fourth. There is no "cingulum" on the external surface of the teeth; but there is one, not very prominent, on the internal, terminating anteriorly in the small cusp before mentioned. There is rather a wider interval between the last two molars than between

any other two of the series. In the lower jaw the molars are similar in form to those in the upper. The first is extremely diminutive, the second larger, and the last three larger still and of equal size. All have an anterior cusp, increasing progressively from the first to the last, and a more distinct internal cingulum than in the upper jaw. The upper canines are moderate in size; and there is no appreciable difference between the sexes. Those of the lower jaw are much laterally compressed, and have a sharp cutting-edge on their inner surface. When the jaws are closed, the lower molars fall be-

Fig. 6.

*Otaria forsteri*, right ear.

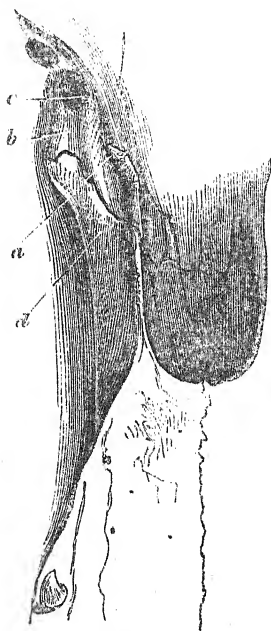
tween, and a little behind, the upper; and the lower canines fit exactly into a deep indentation formed in the præmaxilla, and project backwards  $\frac{5}{8}$  inch beyond and behind the root of the exerted portion of the outermost incisor. These last, as usual in the *Otariidæ*, are very large; the four middle ones diminutive and of equal size. In the lower jaw, the two outermost incisors are somewhat larger than the two inner (Plate LXXII. fig. 2).

In both specimens, the anterior portion of the palate is much hollowed out, while the posterior is nearly flat, with its hinder edge bounded by a sharp ridge, which is continued up to the pterygoids (fig. 7, *a*). These are unusually thin and diminutive plates of bone, with small, outwardly curved "hamuli." The pterygoid plate of the alisphenoid (*b*) is extremely strong and broad, divided into two massive pillars of bone, containing the alisphenoid canal (*c*) between them. The innermost of these pillars projects furthest forwards to articulate with the palatine and pterygoid, while the outermost receives an equally massive process of the palatine, which projects outwards and backwards to articulate with it. I observe this construction in the two skulls from New Zealand, and in the four from Amsterdam Island; but I have not found it in any other species of *Otaria*. In most, the pterygoid extends much further back, even articulating with the basisphenoid; and the processes of the alisphenoid are by no means so massive. The hinder edge of the palate is nearly the same in shape in both specimens; only it is slightly narrower in the female.

The mastoid portion of the periotic is produced at its posterior edge into a high ridge or knob. The shape of this differs slightly in the two specimens; but the general character is the same.

The upper surface of the skull is nearly flat; it is much contracted between the orbits. The orbital processes of the frontals curve outwards and backwards, and are truncated at their hinder extremity, which is free. From between these processes the face slopes slightly

Fig. 7.



*Otaria forsteri*, palate-bones.

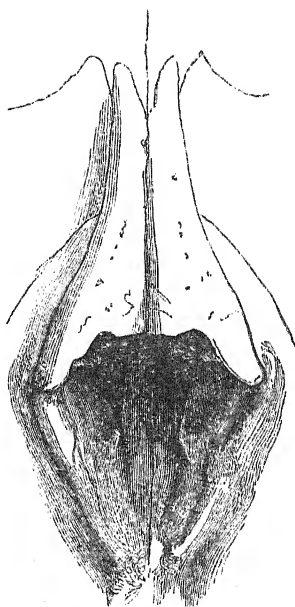
*a*, pterygoids; *b*, alisphenoid; *c*, alisphenoid canal; *d*, palatine.

downwards. The nasals are very long and narrow (fig. 8, p. 668). The præmaxilla, which projects forwards  $1\frac{1}{2}$  inch beyond the nasals, is hollowed out at its sides, and terminates in a very marked knob, to which is attached the ligament which holds the cartilaginous snout in place. These last characters are well shown in Dr. Gray's figure of his *Euotaria cinerea* (Hand-List of Seals, etc. plate xxvi.), based on one of the specimens sent by Dr. Hector from Milford Sound. Most of the teeth, however, have unfortunately been lost. There is a better figure of the same skull, with the teeth, in P. Z. S. 1872, p. 656, figs. 1, 2, where, as afterwards explained by Dr. Gray, it is wrongly marked *Arctocephalus nigrescens*; and I think that the appearance of a second subsidiary lobe on the posterior side of the molars is due to the artist having placed the skull in such a position that he saw the edge of the prominent internal cingulum.

Let us now compare the description by John Reinhold Forster to which reference is so frequently made\*.

March 31, 1773. [Cook had landed at Dusky Bay, 5 days previously.]

Fig. 8.



*Otaria forsteri*, nasal bones.

*PHOCA URSINA*, L. (Drawing G †.)

Seal with ears; hands free; feet webbed on the under surface, naked between the fingers, hardly nailed.

This species of Seals, in my opinion, most nearly resembles *Phoca ursina*; but it is much smaller, and differs in a few points. Its habits are gregarious: males, females, and cubs live together on rocks surrounded by the sea in Dusky Bay. They are timid, and fling themselves off the rocks into the sea at the approach of man; the older animals, however, if wounded, or surrounded so completely that escape is impossible, bite the weapons with which they are attacked; nay, more, they venture to attack, in the water, the boat that is pursuing them. They swim with such rapidity under water, that a boat rowed by six strong men can scarcely keep up with them. They are extremely tenacious of life; for after they had been pierced by ball in many places, and even through the head, they yet conti-

\* *Descriptiones Animalium*, ed. Lichtenstein, 8vo, Berlin, 1844, p. 64.

† "Figura picta G." This refers to the drawings by his son, described below, p. 671.

nued to live : nay, more ; after their skull had been fractured by an axe they continued to groan loudly for several hours. Old animals stink most foully. The flesh of the young is very delicate ; and was eaten by us, not from necessity, but on account of its excellence. Some weighed as much as 220 lb. \*, cubs scarcely 10 or 12. The former exceeded 6 or 7 feet in length ; the latter hardly reached  $2\frac{1}{2}$ .

The body is conical from the shoulders to the tail, and conical in the reverse direction from the shoulders to the head †. The hair all over the body is adpressed, short, soft, black, with reddish grey tips. Beneath the hair is a soft, thick, delicate, reddish fur. Head rounded ; snout, from the eyes forwards, pointed ; behind the eyes the head suddenly bulges out ‡. Mouth prominent. Nose black, naked. Septum hollowed out into a channel. Nostrils vertical at first, then diverge sideways at a right angle. Lips moderate. Whiskers few, strong, bristly, arranged in five rows, after the manner of a quincunx, black ; the hindermost, especially in the old individuals, stronger, white. Teeth separate, white. Incisors with broad crowns, 4 in each jaw ; the upper have their crowns double, with points before and behind ; the lower simple. Upper canines 2 on each side, strong, subconical, recurved, sharply keeled on their inner edge : the inner smaller than the outer, which is six tenths of an inch longer. Lower canines one on each side, smaller than the outer one of the upper jaw, but larger than the inner. Upper molars 6 on each side, strong, subconical, like those of a dog ; at their roots on each side are rudiments, like the germs of new teeth §. Lower molars 5 on each side. Total—upper teeth 20, lower teeth 16, = 36.

Tongue beset with papillæ ; the point indented or emarginate. Palate disposed in folds. Eyes rather prominent, full, spherical, with a "membrana nictitans" on their inner edge. Iris dark. Ears small, folded, erect, rather stiff, sublanceolate, hairy on the outside, smooth on the inside.

Hands free, fin-shaped (not, as in most Seals, concealed beneath the skin). On the upper surface they are covered with hair down to the nails ; the rest, and the under surface, destitute of hair, black ; in form subtriangular ; on the under surface, from the apex up to the body, the skin is disposed in wavy folds. The rudimentary nails are very small, shaped like lentil seeds, and situated at the apex of the phalanges before the cartilaginous prolongations commence. The entire hand is a shapeless, undefined mass, but jointed within beneath the skin ||.

\* Dr. Hector gives the weight of two males as 258 and 270 lb. respectively ; of a female 208 lb. (Trans. N.Z. Inst. iv. 296).

† "Corpus subconicum a humeris ad caudam, et obconicum a humeris ad caput."

‡ "Caput subglobosum, versus rostrum attenuatum ad oculos, versus corpus subito incrementum capit."

§ "Ad quorum radices utrinque sunt gemmæ quasi novorum dentium."

|| "Rudimenta unguiculorum minima, lentiformia, ad apices phalangium, ante epiphyses cartilagineas sitæ. Tota forma manuum moles rudis et indistincta, at interior sub cute articulatur."



Feet webbed, the outermost toe three times as broad as the rest, the innermost twice as broad. Toes all subequal, covered with hair on their upper surface; but the spaces between the fingers are bare, and so is the whole plantar surface of the foot. Between the toes the cartilage is emarginate. On the outermost and innermost toes are the rudiments of nails only; on the three middle ones are linear, blunted, semicylindrical nails close to the end of the digit, before the cartilaginous epiphyses commence.

Tail short, conical, covered with hair between the feet.

N.B. The example described was small, scarcely of middle size, and weighed only  $32\frac{1}{2}$  pounds; from this the measurements were taken. In larger specimens all the limbs were larger, but maintained the same proportions.

	ft.	in.
Length from nose to tip of middle digit of "pes" ..	3	$9\frac{1}{2}$
"    "    to end of tail .....	3	$2\frac{1}{2}$
"    of tail .....		2
"    of "pes," to tip of "pollex" .....		9
Breadth of "pes" at tarsal joint* .....		$2\frac{2}{5}$
"    at distal extremity .....		5
"Pes" from tarsal joint† to the origin of nail of middle finger .....		$6\frac{1}{2}$
Length of nail of middle toe .....		$0\frac{7}{10}$
Breadth of nail of middle toe .....		$0\frac{1}{5}$
Length of "manus" .....	1	0
Breadth of "manus" close to body‡ .....		$3\frac{3}{5}$
Breadth of "manus" from the apex to the point where the first hairs grow .....		6
Length of "manus" to the origin of the nail .....		9
Length of nails .....		$0\frac{3}{10}$
Breadth of nails .....		$0\frac{1}{10}$
Distance from median point of upper lip to opening of nose above .....		$1\frac{3}{10}$
Length of "septum narium" .....		$0\frac{2}{10}$
Distance from median point of upper lip to anterior edge of orbit .....		$2\frac{1}{2}$
From outer edge of orbit to edge of cornea§ .....		1
From median point of upper lip to origin of ear .....		5
"    "    to angle of mouth ..		$2\frac{3}{10}$
Length of ear .....		$1\frac{1}{10}$
"    whisker .....		$3\frac{1}{2}$
"    "    in larger specimen .....		$5\frac{1}{2}$
Girth of head behind ear .....	1	3
"    body at shoulder .....	2	$0\frac{2}{10}$
"    anus .....		$10\frac{1}{2}$
Length from mouth to anus .....	3	$1\frac{2}{10}$

I submit that there can be no doubt that this description refers to

\* "Pes latus ad lacertos."

† "A lacertis."

‡ "Ad insertionem armi."

§ "A cantho majore ad minorem."

our animal. It corresponds exactly in all its most important points, as in colour, position and shape of nostrils, and form of the hind feet. The only sentence that puzzles me is that referring to the molar teeth. Forster says:—"At their roots on each side [utrinque] are rudiments, like the germs of new teeth." From the use of the word "utrinque" in other parts of his description, I feel nearly sure that he means "on both sides of the jaw;" but of course the word would most naturally signify "on both sides of the tooth," and imply that it had two subordinate cusps. This, however, would not agree, so far as we know any thing about the New-Zealand Seals, with the possession of copious under-fur.

There is a figure of this *Otaria* among Forster's drawings in the British Museum, which were executed, not by John Reinhold Forster, but by his son George Forster. It is on a folio page 19 $\frac{1}{4}$ "  $\times$  13", marked (2). It represents a small *Otaria* lying on a rock, with its feet stretched out behind it, of a dark brown colour. It is badly drawn, and very unlike Forster's vigorous and artistic style. The nails are indicated as being distant from the free edge of the cartilage by about their own length. The snout is made to project considerably beyond the lower lip. Beneath is written, in pencil "*PHOCA URSINA*—*potius volans*," *antarctica*, for *ursina*, having been erased,—and on back, "Dusky Bay, a young animal 6 to 10 feet in length" (*sic*). The sketch is not signed "G. Forster" as most of the others are\*.

In the Zoology of the Voyage of the 'Astrolabe,' by Quoy and Gaimard, two species of *Otaria* are described—one called *Otarie cendrée*, and the other *Otarie australe*; and the skull and animal of both species are figured. Let us take the former first. The authors regard it as identical with the *Otaria cinerea* of Péron. If so, it cannot be our animal; for Péron describes his *Otaria cinerea* as having "short, hard, coarse hair," and contrasts it with "Seals of smaller size which possess fur of good quality." Again, the description of Messrs. Quoy and Gaimard indicates an animal with

\* As Forster's drawings of Otarias are often referred to, and as, with reference to this very species, I find in Dr. Gray's latest publication ('Hand-List of Seals, etc. p. 35) the following statement—"Several beautiful drawings of the animal were made for Sir Joseph Banks, which are now with the rest of his drawings in the Botanical Department in the British Museum,"—I examined the set carefully last summer, and found that there were only three drawings of Pinnipedia in all. The first is the one described above, marked "2."

That marked "3" is a double sheet of paper 28"  $\times$  21", labelled "*Phoca leonina*, Linn.," and Jan. 11, 1775 in corner. "*Phoca leonina*" is written again at the bottom of the page—and on back, "South Georgia." It is a pencil sketch of a large Pinniped, with the upper jaw projecting considerably beyond the lower, but is clearly not an *Otaria*. It is probably a Sea-elephant. Nails are indicated on fore flippers, none on hind. Signed in left corner, "Forster."

That marked "4" is a very spirited sketch in pencil, as large as the last, of an old male Sea-lion with an abundant mane, in a sitting position, upright and defiant, with his hind feet brought under his body. It is marked "*Phoca jubata*, Staten Land, 2 Jan. 1775," and on back "Year's Islands, near Staten Land." It has been signed in left corner; but the signature has become nearly obliterated. Only part of the last syllable remains, but enough to show that the handwriting is the same as that on the others.

much the same characters as Péron does—adding, that when the hair is divided “a reddish fur of no great thickness is seen”<sup>\*</sup>.

Lastly, though the skull has some characters in common with that of our specimen, as the way in which the incisors and canines interlock, and the peg-like process at the union of the premaxillæ, the molars are quite different. They have all three cusps each. I examined this skull on two successive visits to Paris last summer. It is marked “1539. *Phoque cendrée* ou *ourson*, *Phoca cinerea* ou *ursina*, adulte du Port Jackson, Nouvelle Hollande, par MM. Quoy et Gaimard, expédition de l’Astrolabe etc. Août 1827, Voy. de l’Astr. 89. Peau à la Zoologie.” Its length is  $10\frac{1}{2}$  inches, width  $6\frac{1}{2}$ . The molars,  $\frac{6-6}{5-5}$  have never been disturbed. The opening of the palate is long and V-shaped. The whole skull bears a very close resemblance to that of the type of *Otaria delalandei*=*O. pusilla*, from the Cape of Good Hope. The stuffed skin in the Zoological Museum, No. 202, is in a bad state, faded and dilapidated. It indicates an animal about 8 feet long, without under-fur. The figures of it in the plates of the ‘Voyage de l’Astrolabe’ (plates 12, 13) are clearly inaccurate. Plate 12 shows nails on all the digits of both “pes” and “manus;” plate 13, on all those of the “manus” and on four only of the “pes”†. On the whole, therefore, I am disposed to think that the name *O. cinerea* should be restricted to this species, and the older name *O. forsteri*, given by Lesson (Dict. Class. d’Histoire Naturelle, xiii. 421), reserved for our animal. The name *cinerea* was applied to the latter by Dr. Gray, though he doubted whether it really was identical with the *O. cinerea* of Péron (Supplement to the Catalogue of Seals and Whales in the British Museum, 1871, p. 24; Ann. & Mag. Nat. Hist. 1866, xviii. p. 236), when describing as “*Arctocephalus cinereus*, Australian Fur-Seal,” two young skulls and a stuffed skin sent from North Australia by Mr. John Macgillivray in 1853; on which specimen he founded subsequently his genus *Gypsophoca* (P. Z. S. 1872, p. 659). I have studied these skulls carefully, and feel certain that they are only the young of our animal—an opinion which I am glad to find is shared by Dr. Hector. The stuffed specimen in the British Museum is 3 feet  $5\frac{1}{2}$  inches long. Pelage dark brown, nearly black above, with a dense pale brown fur over the whole body, thickest on the back. On the breast, a light yellow tip appears upon the hair, which becomes longer under the throat. Beneath and round the eye is a dark spot. The pale colour of the throat extends between eye and ear, and over the under surface of the body.

This brings me to the skulls from Amsterdam Island marked *e, f, g, h*:—*e*.  $6\frac{1}{2}$  inches long,  $3\frac{3}{4}$  wide; *f*.  $6\frac{1}{2}$  inches long, 4 wide; *g*.  $7\frac{1}{2}$  inches long,  $4\frac{3}{4}$  wide; *h*.  $7\frac{1}{4}$  inches long, 4 wide.

Teeth normal in all except *g*, where the last upper molar on the

\* “On voit un feutre roux peu épais” (Zoologie de l’Astrolabe, i. p. 90).

† The description (Zoologie, i. p. 90) says: “Les ongles des membres antérieurs sont à peine indiqués. Ceux des postérieurs sont étroits; les trois intermédiaires sont plus saillans, et l’extérieur n’est point apparent.”

right side has fallen out, and the alveolus is filled up. I have compared them with the type of *Gypsophoca tropicalis*, and can detect no difference whatever between them.

I was allowed, by the kindness of M. Milne-Edwards, to examine three stuffed specimens of this species at Paris, brought home by M. Vlamin, at the same time, from the same place. My skulls were bought at Vasseur's shop, and had been extracted from skins belonging to some of the ship's officers.

1. A young specimen. Sex not noted.

	ft.	in.
Length along curve of back, from tip of nose to root of tail.....	2	6
Length of ear.....		1
„ tail .....		1 $\frac{3}{8}$

General colour of pelage a shining black, which on the breast and under the body has a slight brownish tinge. Individual hairs light brown at the roots. Length about 1 inch. An abundant crop of light-brown fur all over the body, most plentiful on back and breast. In the "manus," the first and second digits only are marked by prolongations of the cartilage. The rest of the hand is bounded by a wavy line. In the "pes" the nails of the first and the fifth toe are rudimentary. The third is the longest. Short hairs descend along the phalanges down to the nails.

2. Adult. The skull shows that it is full-grown, but not old.

Teeth not worn. Pelage on back has a brindled appearance, due to the fact that each hair is light brown at the base, then black, and yellow at the tip. The fur (light brown) is very dense and long, reaching nearly to the tips of the long hairs, which are about  $\frac{3}{4}$  inch long. On the breast the yellow tips are elongated, so that that part of the animal has the appearance, when the hair is not smooth, of being barred or spotted with yellow; but this is due merely to the fact that the proportions of the colouring are changed. This yellow extends over the breast, throat, upper lip (but not across the nose), upwards behind the eyes, and between them and the ears. Beneath the eyes is a dark brown spot. Ears black, with very short light-brown fur extending over two thirds of them. The velvety fur over the "manus" of the young has now become light-brown hair. The light yellow does not appear to extend under the belly, but is there replaced by a light brown. Hind flippers covered with dark brown hair, which extends over the rump. Tail nearly black.

	ft.	in.
Length along back, as before .....	3	5 $\frac{1}{2}$
„ of ear.....		1 $\frac{1}{4}$
„ of manus along outer edge .....		8
„ of pes .....		10

In this specimen, the nails fail to reach the edge of the cartilage by about  $\frac{1}{4}$  inch.

3. A specimen rather older than the last, judging from the state of

its teeth. The measurements and colour are the same, except that the yellow is clearer.

The only difficulty I feel in establishing the identity of this species from Amsterdam Island with the Australian one, is the presence of this yellow colour on the breast and sides of head, though, indeed, that is found on the young animal in the British Museum from North Australia, as noted above. But on that character only, I do not feel justified in making a new species, but would prefer to regard the Amsterdam specimen as a variety only, and wait for further information and more specimens. I observed very similar external characters in Professor Peters's beautiful *Otaria gazella*\*, from Kerguelen's Land, which I saw at Berlin this summer; but the skull was very different. While attempting to establish the identity of the two described Fur-Seals of Australia, I ought to mention that I find a competent colonial naturalist like Dr. Haast recording a second species as "*Gypsophoca tropicalis*, Little Fur-Seal" in his list of the bones found in the Sumner Moa-cave (Trans. N.Z. Inst. vii. p. 84). On the other hand, I think there can be no doubt that the species before us from New Zealand is identical with that with "the sharp pointed nose and the general colour of the hair approaching to black," seen by Flinders in Bass's Straits. If this be really the case, namely that the Fur-Seal of Tasmania is identical with that of New Zealand, it is more than probable that that of the Nuyts archipelago and the rest of the south coast of Australia ought to be referred to the same species.

We now come to Péron's *Otaria albicollis*. I venture to suggest that this large *Otaria* with a white spot on the back of the neck can be no other than Gray's *Neophoca lobata*, figured by Gould, 'Mammals of Australia,' iii. 49; and Quoy and Gaimard's *Otaria australis* (Voyage de l'Astrolabe, Zoologie, i. p. 95, pl. 14). The young skull, figured by Gray in his 'Spicilegium Zoologicum,' plate iv. fig. 1, when establishing the species, has the peculiar characters of *O. australis* which I have observed in the type specimens preserved in the Museum of the Jardin des Plantes, Paris. The most striking of these is the rounded form of the upper surface of the skull between and behind the orbits, which is so marked as to give it a strong resemblance, when viewed sideways, to that of *Ursus labiatus*. The skull of Gray's *Neophoca lobata* (figured, Hand-list, plate xxx.), which is of a very old animal, shows this peculiar shape extremely well, and also the remarkably broad recurved orbital processes of the frontals. Indeed Dr. Gray himself seems to have regarded the two species as identical (*l. c.* p. 43). The specimens at Paris that can unquestionably be referred to this species are three skulls (Nos. 1502, 1532, and 1533) and one skeleton, not adult, all brought by the 'Astrolabe,' and one skull (No. 1535) brought by the 'Bonite.' The number of the molars, on which Dr. Gray lays great stress (*l. c.* p. 41), is clearly not so constant as in others, but still normal more often than the reverse. The skeleton has m.  $\frac{6-6}{5-5}$ ; nos. 1502 and 1533, m.  $\frac{6-6}{5-5}$ ;

\* Described by him in the 'Monatsbericht der k. Akad. der Wissenschaften zu Berlin,' June 10, 1875.

no. 1532, m.  $\frac{5-5}{5-5}$ ; and no. 1535, m.  $\frac{5-5}{0-0}$ . In these specimens all the molars have a well-marked internal "cingulum," and the four first, in both jaws, a tolerably large anterior cusp; there is no posterior cusp. The belief in its existence is due to the size of the "cingulum," whose posterior edge may easily be mistaken for a cusp. The last two above and the last below are bicuspid. A skull in the Leyden Museum, marked "*Otaria australis*, Coll. Brookes. Nouv. Hollande. Type de l'*Arctocephalus lobatus*, Gray, Spic. Zool. tab. 4. fig. 2. *Otaria australis*? 'Astrolabe,' tab. 14," has only five molars in the upper jaw, as I learn from the notes on that collection made by my friend Professor Flower, and which he has most kindly allowed me to use. The hinder opening of the palate in adult but not old specimens is V-shaped.

Mr. Gould states that old animals are destitute of fur, and that the males and females differ in colour; Mr. Scott says, "the commercial value of the animal consists in the hide and oil only"\*; and Quoy and Gaimard note that "the distinguishing mark of this species is, that on no part of the body is there any fur at the base of the hair"†. I reconcile the discrepancies in the figures of Gould and Quoy and Gaimard by suggesting that the white spot may be a distinguishing mark of males, and therefore would not be mentioned by Quoy and Gaimard, who studied a female only. This idea is supported by Mr. Scott's remarks that females are lighter than males, which are of a dark brown; while Quoy and Gaimard themselves admit (though their figure does not show it) that the yellowish grey of the back ("un gris qui a des reflets jaunâtres") becomes lighter on the neck and passes into a dirty white on the head, cheeks, and muzzle. Moreover both *Arctocephalus lobatus* and *Otaria australis* are noted as having nails on all five toes—a character which is clearly not peculiar to the *Otariidæ* of Australia, and which it is not likely would be repeated in two species from the same or neighbouring localities.

The synonymy will therefore, if my views be accepted, run as follows:—

#### I. OTARIA FORSTERI.

1828. *Otaria forsteri*, Lesson, Dict. Class. d'Histoire Naturelle, xiii. 421.

1829. *Phoca forsteri*, Fischer, Synopsis Mammalium, 1829, p. 232.

1844. *Phoca ursina*, J. R. Forster, Descript. Animal. p. 64 ‡.

1866. *Arctocephalus cinereus*, Gray, Ann. & Mag. xviii. 236.

1872. *Gypsophoca tropicalis*, Gray, P. Z. S. 1872, p. 659.

Hab. Dusky Bay, N. Z. (*Forster*); Cape-Barren Island, Bass's

\* Mammalia, Recent and Extinct (8vo, Sydney, 1873), p. 21.

† "Ce qui distingue cette espèce c'est qu'il n'y a nulle part de feutre à la base des poils" (*L. c.* p. 96).

‡ This name must now be dropped for this species, having originated in a mistaken reference to the Linnean name for the species from Behring's Island, described by Steller as *Ursus marinus* in 1751 (Linnaeus, Syst. Nat. ed. 1766, i. p. 55; Nov. Comment. Petropol. 1751, p. 331).

Straits (*Flinders*); Steeple Rock, off Cape Foulwind, W. coast of Otago (*Hector*).

Pelage of coarse hair. General colour, in young, black when wet, brown when dry; underside of body of a lighter tint than upper; individual hairs pale yellow at base, with light-yellow tips. Dense under-fur all over the body of same colour as the base of the hairs. In older animals the hairs are tipped with white, and there is a space of pale yellow above and behind the mouth and round the ear. A dark grey spot beneath the eye. Ears light brown, black within.

Digits I, II, and III of the "manus" indicated by prolongations of cartilage; beyond these the limb is bounded by a wavy edge. Rudimentary nails on first four digits only. "Pes" with hair extending down the digits to the nails. Digits II, III, and IV with nails, which fail to reach free edge of cartilage by about their own length.

Snout tapering, obliquely truncated, with nostrils on sloping surface.

Teeth, i.  $\frac{3-3}{2-2}$ , c.  $\frac{1-1}{1-1}$ , m.  $\frac{6-6}{5-5}$ , =36. Canines moderate; in lower jaw compressed, with sharp anterior cutting-edge. Molars small, conical; first four upper with anterior cusp, fifth tricuspid, sixth simple; these two much recurved. Lower molars have all anterior cusp. For form of hinder edge of palate see fig. 7.

Length of adult ♂ 7', of adult ♀ 6½'.

## 2. OTARIA CINEREA.

1816. *Otaria cinerea*, Péron, Voyage aux Terres Australes, ii. 77.

1830. *Otarie cendrée*, Quoy & Gaimard, Zoologie du Voyage de l'Astrolabe, i. 89.

*Hab.* Kangaroo Island (*Péron*); Port Western (*Quoy & Gaimard*).

Pelage grey on back, becoming lighter on muzzle; rusty grey under body. Fur sparse, reddish. Nostrils, judging by the figure of Quoy and Gaimard, as in *O. forsteri*.

Teeth 36, as in *O. forsteri*; upper and lower molars all with three cusps.

Length of ♂ between 7' and 8'.

## 3. OTARIA ALBICOLLIS.

1816. *Otaria albicollis*, Péron, Voyage aux Terres Australes, ii. p. 118.

1828. *Arctocephalus lobatus*, Gray, Spicilegia Zoologica, part i. p. 1, plate iv. fig. 2.

1830. *Otaria australis*, Quoy & Gaimard, Zoologie du Voyage de l'Astrolabe, i. 95.

1863. *Arctocephalus lobatus*, Gould, Mammals of Australia, iii. 49.

1866. *Neophoca lobatus*, Australian Hair-Seal, Gray, Ann. & Mag. xviii. 231.

1866. *Otaria lobata*, Peters, Monatsb. Akad. zu Berlin, pp. 276, 668.

1870. *Zalophus lobatus*, Allen, Bulletin Mus. Harvard, vol. ii. p. 44.

1873. *Zalophus lobatus*, Counsellor Seal, Scott, 'Mammalia, Recent and Extinct,' p. 21.

*Hab.* King George's Sound (*Quoy & Gaimard*); Houtman's Abrolhos (*Gould*).

Pelage brown in males, with a distinct yellow space on the back of the neck; in females grey, becoming a dirty white on the neck and head; red under the body. The line of demarkation between the red and grey is said to be very distinctly marked. No under-fur. Nails on all five digits of "pes." Snout short; nostrils on upper surface.

Teeth 36, sometimes 34; first four upper and lower molars with anterior cusp; last two upper and last lower tricuspid. Skull rounded behind orbits. Opening of palate wide, V-shaped.

#### 4. OTARIA HOOKERI.

1844. *Arctocephalus hookeri*, Gray, Zool. Erebus and Terror, Mammalia, p. 4.

1871. *Phocarcetos hookeri*, Gray, Suppl. to Cat. of Seals and Whales, p. 15.

1873. *Otaria hookeri*, J. W. Clark, P. Z. S. p. 750.

*Hab.* Auckland Island (*J. W. Clark*); Campbell Island (*French Expedition*, 1875); coast of New Zealand, subfossil (*Dr. Hector*).

I suggest this rearrangement of the Australian *Otariidæ* with much diffidence, as the quantity of material at present available is quite insufficient for any thing like certainty respecting them. I am especially doubtful about the identity or difference of *O. forsteri* and *O. cinerea*. Allen (*l. c.* p. 40) considers that "Péron, under the name *Otaria cinerea*, undoubtedly referred to *Zalophus lobatus* of recent writers." Still the additional cusp to the molar teeth in the latter would seem to preclude the possibility of their being the same.

### 9. On the Generic Peculiarities of the distinctively Madeiran *Achatinæ* of Lowe. By the Rev. R. BOOG WATSON, F.R.S.E., F.G.S. Communicated by J. GWYN JEFFREYS, Esq., LL.D.

[Received October 27, 1875.]

I have to propose a new genus for certain species of Madeiran Mollusca hitherto classed as *Achatinæ*.

The name *Lovea* is a tribute to the labours of Mr. Lowe in connexion with these species, as, indeed, with the whole Natural History of Madeira.

The distinctive characters of the genus in which it differs from *Achatina* are:—

*The mantle extends beyond the edge of the aperture all round. It is thinly spread over the outside of the shell, and extends like a tongue backwards behind the posterior corner of the aperture.*

*The tail carries a mucous gland and is abruptly truncate.*



This genus thus bears to *Achatina* the same relation that *Arion* does to *Limax*, and *Nanina* to *Helix*.

All the members of the genus have the shell highly polished, its brilliant lustre being obviously connected with the perpetual movement upon it of the mantle, and especially of its posterior prolongation, a movement also eminently characteristic of *Nanina*.

In spite of very careful search no dart could be found.

The jaw is horny, light brown, crescent-shaped, crossed from behind forwards by numerous small converging ridges, one of which forms a distinct median line. The edge is not toothed, but forms a continuous curve. The radula consists of numerous rows of multitudinous teeth. The centre tooth is minute, with a sharp central point and a faint point on either side like a shoulder. It is attached to a strong, flat, basal plate, shaped like the crescent-formed cutting-knife of a shoemaker or half a dumb-bell. The lateral teeth are

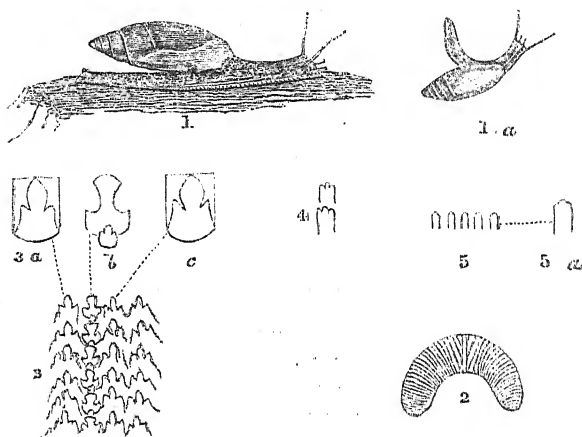


Fig. 1. *Lovea (Achatina) tornatellina*, Lowe. 1. enlarged; 1 a, natural size.

2. Jaw, greatly magnified.
3. Radula, central and first lateral teeth, magnified.
3. a, c, left and right laterals; b, central tooth: greatly magnified.
4. Teeth intermediate between the centrals and extreme edge, greatly magnified.
5. Teeth at extreme edge, magnified; a, one of the same, greatly magnified.

much larger, with a strongly developed centre point and two broad sharp shoulders. They are attached to flat, square, basal plates. As they pass over from the centre, they become more and more rudimentary (the outer shoulder first retreating toward the base), till they become at last mere square specks with an undefined back and a faintly serrated front edge. I believe that these features will be found common to all the distinctively Madeiran species of this group. Of course *Achatina acicula* and *Cochlicopa lubrica* (the *maderensis*

of Lowe) fall off from it; for they certainly have not the characteristics of the genus. Does the *Achatina folliculus*, Gron., a common European species, belong to this new genus or not? Surely, had it possessed the generic peculiarities mentioned above, the fact would long ago have been noticed. I have not been able as yet to decide the question, and have, indeed, to regret that so few of the distinctive Madeiran species have been examined by me. It was but very shortly before leaving the island that I noticed the caudal gland in *A. tornatellina*; and for the other species here described, I have been indebted to the kindness of my friend Mr. Moniz, who, after considerable difficulty and delay, procured from Porto Santo the other species here described.

LOVEA (ACHATINA) MELAMPOIDES, LOWE.

*Colour.* The general effect is light, of a faint ruddy brown tinge. The foot is gelatinous, translucent, white, with a faint tinge of brown; that of the body is a slightly darker tinge of brown which extends along above the edge of the foot to the gland at the tail. The head and neck are slightly browner than the body, and are scored with the long grey muscles of the tentacles.

The *mantle* is of the same colour as the body. The mantle-lobe, in my specimens, which had been long in confinement, was small and thin and transparent, but quite distinctly lapping out beyond the aperture and turned back upon the edge and prolonged posteriorly.

*Tentacles* rather long, but not thin, seldom extended, terminating in small round bulbs, on the upper surface of which is an ocular lens shaped like a thumb-nail, in which the minute black eyes appear. The under tentacles are very short and not so dark as the upper ones; they are seldom fully exerted\*. Both the body and the tentacles are finely tubercled.

*Foot* narrow. *Tail* very long, extending nearly or quite to the apex; very slender and sharp-pointed on the sole, but broad and obliquely truncate above, with a gland distinctly projecting into a sharp angulation a little short of the end of the tail.

*Jaw* horny, crescentic, about .05 inch ( $1\frac{1}{4}$  mill.) long (taken straight, not along the curve), and .01 inch (or  $\frac{1}{4}$  mill.) wide. It is scored across with about 60 slightly converging ridges.

The *radula* consists of overhanging, long-pointed, 2-shouldered teeth fixed on a square base. The centre tooth is very small and extremely short, with a minute sharp overhanging point and very slight shoulders. The base to which it is attached is not square, but oblong like a narrow crescentic shoemaker's knife. On either side of this central tooth there are 50 lateral teeth; but as they go off to either side they become rudimentary and appear at last as mere square ticks. The outer shoulder tends earliest to recede towards the root of the tooth and to become rudimentary. There were at least 100 rows; but many of them had been lost.

\* I have noted that they seemed to have minute eyes; but I could not quite satisfy myself of this.

## LOVEA (ACHATINA) TORNATELLINA, Lowe.

*Colour* darkish grey, somewhat speckled, extending along above the foot to the tail-gland; the foot is gelatinous, translucent, lighter grey.

*Mantle* whitish with a very slight tinge of grey; it spreads well out beyond the lips of the aperture and is in perpetual movement upon the shell; it is simple, but extends backwards in a tongue half-way across the second last whorl.

*Tentacles* long, rather fine, the under ones rather short; they and the body finely tubercled.

*Foot* narrow. *Tail* extending quite to the apex of the shell, very slender, with a gland above just short of the end of the tail.

*Jaws* and *radula* exactly resemble those of *A. melampoides*, except that they are smaller.

## LOVEA (ACHATINA) TRITICEA, Lowe.

*Colour.* General effect blackish; of the foot translucent white, with a faint tinge of olive-green. Body slightly smoky brownish, a streak of which runs out (above the light edge of the foot) on either side towards the caudal gland, but dies out just before reaching it.

*Mantle* coloured like the body, but rather lighter, stretching out round the aperture so as to embrace the shell.

*Tentacles* short, small, very black, with minute black dots of eyes on the upper point; under tentacles very short, lighter than the the upper; eyes distinct (?). Body and tentacles very finely tubercled.

*Foot* narrow. *Tail* long, narrow, ending below in a sharp point, with an abrupt truncation rising obliquely to a sharp angulation above for the caudal gland, which rises just short of the end of the tail.

*Jaw* and *radula* exactly like those of *Lovea melampoides*, only smaller.

## LOVEA (ACHATINA) ORYZA, Lowe.

In every thing but colour this species exactly resembles the preceding.

*Colour.* General effect is a slight ruddy brownish, having no part dark but the muscles of the tentacles, of which the upper are dark black grey and the under are light.

*Mantle* is just like the body in colour. The projecting flap covering the caudal gland is very well marked.

The upper surface of neck and head and also the tentacles are finely tubercled, while the sides of the head and neck are marked by long fine lines as if the tubercles were there confluent in this form. The eyes are very black and well marked.

The animal, like the others which I have observed, crawls slowly and brings up its shell after it by periodic jerks.

# APPENDIX.

## LIST OF ADDITIONS TO THE SOCIETY'S MENAGERIE

### DURING THE YEAR

1875.

- Jan. 1. 7 Hairy-rumped Agoutis (*Dasyprocta prymnolopha*). Purchased.  
 5 Guira Cuckoos (*Guira piririqua*). Purchased.  
 1 Ani (*Crotophaga ani*). Purchased.  
 2 Orinoco Geese (*Chenaloper jubata*). Purchased.  
 2. 2 Razor-billed Curassows (*Mitua tuberosa*). Presented by Mrs. A. E. Nash. From the Lower Amazons.  
 1 Yarrell's Curassow (*Craia carunculata*). Presented by Mrs. A. E. Nash. From the Lower Amazons.  
 4. 1 Black-handed Spider Monkey (*Ateles melanochir*), ♂. Presented by Mr. H. Campbell.  
 1 Macaque Monkey (*Macacus cynomolgus*), ♂. Presented by Mr. C. Lucas.  
 1 Little Grebe (*Podiceps minor*). Purchased.  
 5. 1  $\frac{3}{4}$ -breed Zebu (between *Bos indicus* ♂ and hybrid *Bos frontalis* ♀). Born in the Menagerie.  
 1 Common Rook (*Corvus frugilegus*), pied var. Presented by Mr. S. Clogg.  
 1 Yellow-bellied Parrakeet (*Platycercus flaviventris*). Purchased.  
 6. 1 Silver-backed Fox (*Canis chama*). Presented by H. N. B. Good, Esq. From Griqualand West, South Africa. See P. Z. S. 1875, p. 81, pl. xvii.  
 8. 2 Yellow-fronted Amazons (*Chrysotis ochrocephala*). Deposited.  
 9. 1 Ring-necked Parrakeet (*Poiceornis torquata*). Presented by Miss Attwood, F.Z.S.  
 1 Saffron Finch (*Sycalis flaveola*), ♂. Presented by the Rev. T. C. Hose.  
 12. 1 Sooty Mangaby (*Cercocetus fuliginosus*), ♂. Purchased.  
 1 Patas Monkey (*Cercopithecus ruber*), ♀. Purchased.  
 13. 1 Crested Porcupine (*Hystrix cristata*). Presented by Mr. Alf. Hay.  
 14. 2 Chukar Partridges (*Caccabis chukar*), ♂ and ♀. Presented by Capt. Murray.  
 15. 1 Pig-tailed Monkey (*Macacus nemestrinus*), ♂. Presented by Dr. Cole.  
 500 Great-Lake-Trout Ova (*Salmo lacustris*). Received from Mr. F. Buckland.

- Jan. 17. 1 Ocelot (*Felis pardalis*). Purchased.  
 1 Australian Goshawk (*Astur approximans*), ♂. Purchased.  
 1 Egyptian Monitor (*Monitor niloticus*). Purchased.  
 18. 1 Smooth-headed Capuchin (*Cebus monachus*). Purchased.  
 1 Naked-throated Bell-bird (*Chasmorhynchus nudicollis*). Purchased. From Bahia.  
 1 Banded Cotinga (*Cotinga cincla*). Purchased. From Bahia. See P. Z. S. 1875, p. 82.  
 1 King Vulture (*Gyparchus papa*). Presented by Mr. M. Billingshurst.  
 19. 1 Rhesus Monkey (*Macacus erythreus*), ♂. Presented by Mr. Walter de Winton.  
 1 Bonnet-Monkey (*Macacus radiatus*), ♀. Presented by Mr. H. Lumsden.  
 1 Macaque Monkey (*Macacus cynomolgus*). Presented by Mr. H. Lumsden.  
 1 Great Sulphur-crested Cockatoo (*Cacatua galerita*). Deposited.  
 2 Blue-crowned Hanging Parrakeets (*Loriculus galgulus*) ♂ and ♀. Purchased.  
 1 Malabar Pastor (*Sturnia malabarica*). Purchased.  
 21. 1 Gold Pheasant (*Thaumalea picta*), ♂. Received in exchange.  
 22. 1 Black-tailed Antelope (*Nanotragus nigricaudatus*), ♀. Purchased.  
 1 Hooded Crow (*Corvus cornix*). Presented by Dr. Stafford.  
 2 Indian Crows (*Corvus splendens*). Presented by Mr. W. Dunn, C.M.Z.S.  
 4 Burmese Land-Tortoises (*Testudo elongata*). Presented by Mr. W. Dunn, C.M.Z.S.  
 23. 1 Thick-necked Terrapin (*Clemmys crassicollis*). Presented by Mr. W. Dunn, C.M.Z.S.  
 1 Bonnet-Monkey (*Macacus radiatus*), ♀. Presented by Miss Hailes.  
 1 Australian Cassowary (*Casuarius australis*). Presented by the Marquis of Normanby. See P. Z. S. 1875, p. 82.  
 1 Collared Fruit-Bat (*Cynonycteris collaris*). Born in the Menagerie.  
 4 Branched Seahorses (*Hippocampus ramulosus*). Purchased.  
 25. 1 Common Paradoxure (*Paradoxurus typus*), ♀. Presented by Mr. D. D. Abbott.  
 1 Bonnet-Monkey (*Macacus radiatus*), ♀. Presented by Miss Melley.  
 1 Clouded Tiger (*Felis macrocelis*), ♂. Purchased.  
 27. 1 Fox (*Canis*, sp. inc.). Presented by Mr. J. Williamson. From the Andes, W. C. South America.  
 29. 1 Macaque Monkey (*Macacus cynomolgus*). Presented by Mr. F. G. Lane.  
 31. 1 West-Indian Agouti (*Dasyprocta antillensis*). Deposited.
- Feb. 2. 1 Macaque Monkey (*Macacus cynomolgus*), ♀. Presented by Mrs. Pole Shawe.  
 1 White-fronted Capuchin (*Cebus albifrons*), ♀. Deposited.  
 1 Zebu (*Bos indicus*), ♂. Born in the Menagerie.  
 3. 4 Summer-Ducks (*Anas sponsa*), 2 ♂ and 2 ♀. Presented by Lord Braybrooke, F.Z.S.  
 2 Indian Tree-Ducks (*Dendrocygna arcuata*). Received in exchange.  
 5. 14 Basse (*Labrax lupus*). Purchased.

- Feb. 5. 3 Grey Mullet (*Mugil capito*). Purchased.  
 1 Cottus (*Cottus bubalis*). Purchased.
8. 1 Peguan Tree-Shrew (*Tupaia peguana*). Presented by the Hon. A. Eden. From Burmah. See P. Z. S. 1875, p. 156.  
 1 Blanford's Squirrel (*Sciurus blanfordi*). Presented by Mrs. Dunn. From Burmah. See P. Z. S. 1875, p. 156.  
 1 Cinerous Sea-Eagle (*Haliaeetus albicilla*). Presented by Capt. S. T. Bridgford. From Japan.
11. 2 Bonnet-Monkeys (*Macacus radiatus*), 2 ♀. Presented by Sir F. S. Gooch, Bart.  
 1 Syke's Monkey (*Cercopithecus albigularis*), ♀. Deposited.  
 24 Basse (*Labrax lupus*). Purchased.  
 2 Spined Cotti (*Cottus bubalis*). Purchased.  
 4 Fifteen-spined Sticklebacks (*Gasterosteus spinachia*). Purchased.  
 1 Five-bearded Rockling (*Motela mustela*). Purchased.  
 1 Flounder (*Pleuronectes flesus*). Purchased.
12. 4 Quica Opossums (*Didelphys quica*). Purchased. See P. Z. S. 1875, p. 157.
15. 2 Feline Douroucoulis (*Nyctipithecus felinus*), 2 ♂. Deposited.  
 4 Fifteen-spined Sticklebacks (*Gasterosteus spinachia*). Purchased.  
 18 Basse (*Labrax lupus*). Purchased.  
 12 Cotti (*Cottus bubalis*). Purchased.  
 3 Flounders (*Pleuronectes flesus*). Purchased.  
 1 Grey Mullet (*Mugil capito*). Purchased.
17. 1 Demeraran Cock of the Rock (*Rupicola crocea*), ♀. Purchased.  
 3 American Box Tortoises (*Terrapene carinata*). Presented by Capt. Cooper, R.N. From Jamaica.
18. 2 Squirrel Monkeys (*Saimaris sciurea*), ♂ and ♀. Purchased.
22. 2 Wild Boars (*Sus scrofa*), ♂ and ♀. Presented by Mr. S. Anderson.  
 2 Sarus Cranes (*Grus antigone*). Received in exchange.  
 2 Banded Tinamous (*Crypturus noctivagus*). Purchased.  
 3 Common Peafowl (*Pavo cristata*), 1 ♂ and 2 ♀. Deposited.  
 1 Mandarin Duck (*Aix galericulata*). Received in exchange.
23. 2 Petz's Conures (*Conurus petzi*). Presented by Miss Hornby.
25. 1 Japanese Pheasant (*Phasianus versicolor*), ♂. Received in exchange.
26. 1 Yellow-lored Amazon (*Chrysotis xantholora*). Purchased. See P. Z. S. 1875, p. 157, pl. xxvi.  
 1 Grey Ichneumon (*Herpestes griseus*). Presented by Miss Barter.
27. 1 Common Raccoon (*Procyon lotor*). Presented by Miss Jackson.  
 1 Herring-Gull (*Larus argentatus*). Presented by Miss Bovill.
- Mar. 2. 1 Anubis Baboon (*Cynocephalus anubis*), ♂. Presented by Mr. R. B. N. Walker, C.M.Z.S.  
 1 Black-faced Spider Monkey (*Ateles ater*), ♀. Purchased.  
 2 White-throated Capuchins (*Cebus hypoleucos*), ♂ and ♀. Purchased.  
 1 Brown Coati (*Nasua nasica*), ♀. Presented by Mr. H. Young.  
 1 Common Peafowl (*Pavo cristata*), ♂. Presented by Major C. Morgan.
3. 1 Hog Deer (*Cervus porcinus*). Presented by Mr. H. Hughes.  
 1 Indian Wild Dog (*Canis primævus*). Presented by H.E. the Governor-General of India. See P. Z. S. 1875, p. 316.

- Mar. 5. 2 Slow Loris (*Nycticebus tardigradus*), ♂ and ♀. Received in exchange.
- 3 Crested Black Kites (*Baza lophotes*). Purchased. See P. Z. S. 1875, p. 316.
- 1 Himalayan Magpie (*Pica botanensis*). Purchased. See P. Z. S. 1875, p. 316.
- 1 Indian Cobra (*Naia tripudians*). Purchased.
- 1 Hamadryad Snake (*Ophiophagus claps*). Purchased. See P. Z. S. 1875, p. 316.
- 2 Indian Eryx (*Eryx johnii*). Purchased.
- 1 White-crowned Mangaby (*Cerocebus ethiops*), ♀. Presented by Mr. W. G. Patchett.
- 1 Egyptian Jerboa (*Dipus aegyptius*). Presented by Mr. A. Corny, R.N.
6. 1 Common Swan (*Cygnus olor*). Presented by Mr. H. E. Butler.
9. 2 Hairy Armadilloes (*Dasypus villosus*). Born in the Menagerie.
10. 2 Indian Muntjacs (*Cervulus muntjac*), ♂ and ♀. Purchased.
- 1 Rose-crested Cockatoo (*Cacatua moluccensis*). Returned.
11. 18 Small Spotted Dogfish (*Scyllium canicula*). Received in exchange.
12. 2 Vervet Monkeys (*Cercopithecus lalandi*), ♂ and ♀. Presented by Mrs. A. Thornley.
- 1 Macaque Monkey (*Macacus cynomolgus*), ♂. Presented by Mr. H. Edwards.
- 1 Yellow-bellied Liothrix (*Liothrix luteus*). Purchased.
13. 1 Chimpanzee (*Troglodytes niger*). Deposited.
15. 1 Bearded Falcon (*Fulco barmicus*). Presented by Capt. Perry. Caught at sea. See P. Z. S. 1875, p. 316.
- 1 Diana Monkey (*Cercopithecus diama*), ♀. Purchased.
17. 1 Lesser Sulphur-crested Cockatoo (*Cacatua sulphurea*). Presented by Mr. H. W. Wood.
- 1 Annulated Snake (*Leptodira annulata*). Presented by Mr. H. B. Whitmarsh.
19. 1 Common Rhea (*Rhea americana*). Purchased.
- 3 Snowy Egrets (*Ardea candidissima*). Purchased.
- 1 Common Boa (*Boa constrictor*). Purchased.
22. 1 Red-crested Cardinal (*Paroaria cucullata*). Presented by Mrs. Johnson.
- 1 African Civet Cat (*Viverra civetta*). Presented by the Earl of Harrington.
- 2 Silky Hangnests (*Amblyramphus holosericeus*). Received in exchange. See P. Z. S. 1875, p. 316.
- 1 Macaque Monkey (*Macacus cynomolgus*), ♀. Presented by Mr. H. Pocock.
- 1 Australian Monitor (*Monitor gouldi*). Presented by Dr. Pardoe.
- 36 Goldfish (*Carassius auratus*?). Presented by Capt. Pastley.
- 3 Black-necked Storks (*Xenorhynchus australis*). Purchased.
25. 2 Yellow-fronted Amazons (*Chrysotis ochrocephala*). Deposited.
- 1 Blue-faced Green Amazon (*Chrysotis bouqueti*). Deposited. See P. Z. S. 1875, p. 316. From St. Lucia.
- 1 Brown-throated Conure (*Conurus aruginosus*). Deposited.
27. 1 Red-legged Partridge (*Caccabis rufa*). Presented by Mr. J. T. Younghusband.
29. 1 Lesser Sulphur-crested Cockatoo (*Cacatua sulphurea*). Presented by Mr. Holborn.

- Mar. 29. 1 Wheatear (*Saricola aenanthæ*). Purchased.  
 31. 1 Nisnas Monkey (*Cercopithecus pyrrhonotus*), ♀. Deposited.  
 1 Crowned Partridge (*Rollulus cristatus*), ♂. Presented by Mr. Barclay Field.  
 1 Indian Python (*Python molurus*). Presented by Mr. A. J. S. Terris.
- Apr. 2. 1 Red-bellied Wallaby (*Halmaturus billardieri*), ♂. Presented by Mr. B. G. Corney.  
 1 Vulpine Phalanger (*Phalangista vulpina*). Presented by Mr. B. G. Corney.  
 6. 1 Green Monkey (*Cercopithecus callitrichus*), ♂. Presented by Mrs. Lange.  
 7. 1 Golden Eagle (*Aquila chrysaetos*). Presented by Mr. J. A. Wright.  
 2 Shoveller Ducks (*Spatula chrypeata*), ♂ and ♀. Purchased.  
 8. 1 Blue-faced Green Amazon (*Chrysotis bouqueti*). From St. Lucia. Purchased. Cf. P. Z. S. 1875, p. 61, pl. xi.  
 1 Porto-Rico Pigeon (*Columba corensis*). Purchased.  
 1 West-Indian Agouti (*Dasyprocta antillensis*, juv.). Purchased.  
 1 Common Barn-Owl (*Strix flammea*). Purchased.  
 2 Leadbeater Cockatoos (*Cacatua leadbeateri*). Presented by Mr. G. L. Prendergast.
9. 1 Vervet Monkey (*Cercopithecus lalandi*), ♂. Presented by Miss E. Sission.  
 1 Ocelot (*Felis pardalis*), ♂. Purchased.  
 1 Blue-and-yellow Macaw (*Ara ararauna*). Deposited.
10. 1 Collared Fruit-Bat (*Cynonycteris collaris*). Born in the Menagerie.
12. 1 Australian Dingo (*Canis dingo*), ♂. Presented by the Zoological and Acclimatization Society of Victoria.  
 1 Impeyan Pheasant (*Lophophorus impeyanus*), ♂. Presented by Capt. J. E. Whitting.  
 1 Syrian Bulbul (*Pycnonotus xanthopygos*). Presented by Mr. E. T. Rogers, C.M.Z.S. See P. Z. S. 1875, p. 348.  
 1 Silky Hangnest (*Amblyrhampus holosericeus*). Presented by Mrs. Arabin.
13. 1 Crested Porcupine (*Hystrix cristata*). Presented by Mr. G. W. Vanderkist.  
 1 Rufous Tinamou (*Rhynchotus rufescens*). Presented by the Viscount Hill.  
 1 Serval (*Felis serval*). Purchased.
14. 2 Crab-eating Raccoons (*Procyon cancrivorus*). Presented by Mr. J. R. H. Wilton.  
 1 Bull-Frog (*Rana mugiens*). Purchased.
15. 1 Patas Monkey (*Cercopithecus ruber*), ♂. Purchased.  
 1 Quica Opossum (*Didelphys quica*). Purchased.  
 1 Red Ground-Dove (*Geotrygon montana*). Purchased.  
 1 Ochre-winged Dove (*Leptoptila ochroptera*). Purchased.  
 1 Milvago (*Milvago chimango*). Purchased.  
 1 Tuberculated Lizard (*Iguana tuberculata*). Purchased.  
 1 Teguxin Lizard (*Teius teguxin*). Purchased.  
 1 Red-and-yellow Macaw (*Ara chloroptera*). Deposited.  
 1 Sharp-nosed Crocodile (*Crocodilus americanus*). Presented by Capt. Drummond, F.L.S.
16. 2 Green-necked Peafowls (*Pavo spicifer*), ♂ and ♀. Purchased.  
 17. 1 Common Swan (*Cygnus olor*), ♂. Purchased.



- Apr. 17. 10 Green Lizards (*Lacerta viridis*). Presented by Mr. G. E. Drage.
- 5 Lump Suckers (*Cyclopterus lumpus*). Presented by Dr. A. H. Smee.
- 3 Great Pipefish (*Syngnathus acus*). Presented by Dr. A. H. Smee.
- 1 Deep-nosed Pipefish (*Siphonostoma typhle*). Presented by Dr. A. H. Smee.
18. 1 Common Quail (*Coturnix communis*). Presented by Miss H. Miller.
19. 1 Great Kangaroo (*Macropus giganteus*), ♂. Born in the Menagerie.
- 1 Red Kangaroo (*Macropus rufus*), ♀. Born in the Menagerie.
- 1 Persian Gazelle (*Gazella subgutturosa*), ♀. Presented by Mr. C. Czarnikow, F.Z.S.
- 2 Silky Marmosets (*Midas rosalia*), ♂ and ♀. Purchased.
- 1 Ocelot (*Felis pardalis*). Purchased.
- 3 Saffron Finches (*Sycalis flaveola*), 2 ♂ and 1 ♀. Purchased.
- 2 Tropical Seed-Finches (*Oryzoborus torridus*). Purchased.
- 2 Bluish Finches (*Spermophila carulescens*). Purchased. See P. Z. S. 1875, p. 348.
- 2 Reddish Finches (*Spermophila nigro-aurantia*). Purchased. See P. Z. S. 1875, p. 349.
- 9 Lined Finches (*Spermophila lineola*). Purchased. See P. Z. S. 1875, p. 349.
- 1 Half-white Finch (*Spermophila hypoleuca*). Purchased. See P. Z. S. 1875, p. 349.
- 1 Palm-Tanager (*Tanagra palmarum*). Purchased.
- 1 Red-headed Cardinal (*Paroaria larvata*). Purchased.
20. 4 Rough-legged Buzzards (*Archibuteo lagopus*). Purchased.
21. 1 Crowned Eagle (*Spizaetus coronatus*). Received in exchange.
22. 1 Black-handed Spider Monkey (*Ateles ater*), ♀. Presented by Capt. A. M. Drummond, F.Z.S.
- 1 Grey Ichneumon (*Herpestes griseus*), ♂. Presented by Mr. H. M. Grellier.
- 1 Great Kangaroo (*Macropus giganteus*), ♂. Presented by Mr. C. V. Blyth.
- 3 Yellow-winged Blue Creepers (*Cæreba cyanea*). Purchased.
23. 1 Macaque Monkey (*Macacus cynomolgus*, white variety), ♂. Presented by Mr. J. Ross. From Samar, Philippine Islands. See P. Z. S. 1875, p. 349.
- 2 Kinkajous (*Cercopithecus caudicolvulus*), 2 ♀. Presented by Mr. C. C. Downes, F.Z.S.
- 1 Golden Eagle (*Aquila chrysaetos*). Presented by Mr. W. P. Warner.
- 1 Indian Kite (*Milvus govinda*). Presented by the Rev. J. R. Wilkinson, F.Z.S.
24. 1 Slender Loris (*Loris gracilis*). Purchased.
- 12 Plaice (*Platyonectes platessa*). Presented by Mr. A. H. Smee.
- 3 Viviparous Blennies (*Zoarces viviparus*). Presented by Mr. A. H. Smee.
- 3 Cotti (*Cottus bubalis*). Presented by Mr. A. H. Smee.
- 1 Spotted Gunnel (*Centronotus gunnellus*). Presented by Mr. A. H. Smee.
26. 1 Pinche Monkey (*Midas ædipus*), ♀. Purchased.
- 1 Hoffmann's Sloth (*Cholopus hoffmanni*), ♂. Purchased.
- 1 Sharp-nosed Crocodile (*Crocodilus americanus*). Purchased.

- Apr. 26. 1 Common Blackbird (*Turdus merula*). Presented by Mr. G. Rogers.  
 1 Common Thrush (*Turdus musicus*). Presented by Mr. G. Rogers.  
 1 Cardinal Grosbeak (*Cardinalis virginianus*), ♀. Deposited.  
 1 Small Hill-Mynah (*Gracula religiosa*). Deposited.  
 28. 1 Pig-tailed Monkey (*Macacus nemestrinus*), ♂. Presented by Miss Humphreys.  
 1 Mouflon (*Ovis musimon*), ♀. Deposited.  
 1 Reddish Finch (*Spermophila nigro-aurantia*). Presented by Mr. J. L. Symon.  
 6 Chilian Pintails (*Dafila spinicauda*). Bred in the Gardens.  
 1 Ground-Hornbill (*Bucorvus abyssinicus*). Received in exchange.  
 29. 4 Upland Geese (*Chloëphaga magellanica*). Bred in the Gardens.  
 1 Concave-casqued Hornbill (*Buceros bicornis*). Received in exchange.  
 1 Bonnet-Monkey (*Macacus radiatus*), ♂. Presented by Mr. C. Hajeë.  
 1 White-cheeked Capuchin (*Cebus lunatus*), ♂. Presented by Mr. P. W. Bennett, F.Z.S.  
 1 Patagonian Conure (*Conurus patagonus*). Presented by Mrs. Cabry.  
 8 Garganey Teal (*Querquedula circia*), 4 ♂ and 4 ♀. Received in exchange.  
 1 Greek Land-Tortoise (*Testudo græca*). Presented by Mr. J. R. Lane.  
  
 May 1. 1 Macaque Monkey (*Macacus cynomolgus*), ♂. Presented by Mr. S. Lawrence.  
 1 Pig-tailed Monkey (*Macacus nemestrinus*), ♂. Presented by Mr. A. B. Gordon.  
 1 Blue-bearded Jay (*Cyanocorax cyanopogon*). Purchased.  
 3 Scarlet Ibises (*Ibis rubra*). Purchased.  
 2. 2 White-fronted Lemurs (*Lemur albifrons*). Born in the Gardens.  
 1 Hairy Armadillo (*Dasypus villosus*). Born in the Gardens.  
 1 Common Kite (*Milvus ictinus*). Presented by the Rev. T. P. Powell.  
 3. 1 Guinea Baboon (*Cynocephalus sphinx*), ♂. Presented by Mr. L. Hart.  
 4. 1 Yellow-shouldered Amazon (*Chrysotis ochroptera*). Presented by Miss Sutherland.  
 5. 1 Hairy Tree-Porcupine (*Cercolabes villosus*). Purchased. See P. Z. S. 1875, p. 469.  
 1 Rock-Cavy (*Cerodon rupestris*), ♂. Purchased. See P. Z. S. 1875, p. 469.  
 1 Siberian Squirrel (*Sciurus vulgaris*, var.). Purchased.  
 1 Molucca Deer (*Cervus moluccensis*), ♂. Born in the Menagerie.  
 1 Pampas Deer (*Cervus campestris*), ♀. Born in the Menagerie.  
 2 Chinese Jay Thrushes (*Garrulax chinensis*). Purchased.  
 6. 1 Patas Monkey (*Cercopithecus ruber*), ♀. Deposited.  
 2 Sand-Smelts (*Atherina presbyter*). Presented by Dr. A. H. Smee.  
 2 Flounders (*Pleuronectes flesus*). Presented by Dr. A. H. Smee.

- May 6. 1 Sole (*Solea vulgaris*). Presented by Dr. A. H. Smee.  
 3 Viviparous Blennies (*Zoarces viviparus*). Presented by Dr. A. H. Smee.
10. 1 Campbell's Monkey (*Cercopithecus campbelli*), ♂. Presented by Capt. Damm.  
 1 Yellow-collared Parrakeet (*Platycercus semitorquatus*). Presented by Mrs. Harborow.  
 2 Antarctic Skuas (*Lestris antarctica*). Presented by the Rev. A. E. Eaton. From Kerguelen Land.
11. 1 Sloth Bear (*Melursus labiatus*), ♂. Presented by Mr. W. D. Wright.  
 6 Chilian Pintails (*Dafila spinicauda*). Bred in the Gardens.
12. 1 Toque Monkey (*Macacus pileatus*), ♀. Presented by Mr. A. Terris.
13. 1 Persian Gazelle (*Gazella subgutturosa*), ♂. Born in the Menagerie.  
 1 Common Barn-Owl (*Strix flammea*). Presented by Mr. H. S. Marks, F.Z.S.  
 1 Proteus (*Proteus anguinus*). Presented by Capt. R. F. Burton.
14. 1 Lesser White-nosed Monkey (*Cercopithecus petaurista*), ♂. Presented by Mr. John Gordon.  
 2 Coatis (*Nasua nasica*). Born in the Menagerie.  
 18 Green Tree-Frogs (*Hyla arborea*). Presented by Mr. J. P. Gassiot, Jun., F.Z.S. From Oporto.
15. 1 Ocelot (*Felis pardalis*), ♀. Purchased.  
 2 Wapiti Deer (*Cervus canadensis*), ♂ and ♀. Deposited.  
 1 Hoffmann's Sloth (*Cholopus hoffmanni*). Purchased.
18. 1 Coypu Rat (*Myopotamus coypus*), ♀. Presented by Mr. R. E. Paton.  
 1 King Penguin (*Aptenodytes pennanti*). Presented by Mr. F. E. Cobb. See P. Z. S. 1875, p. 469. From the Falkland Islands.
19. 1 Black Ape (*Cynopithecus niger*), ♂. Presented by the Hon. Evelyn H. Ellis.  
 1 Larger Macaque Monkey (*Macacus*, sp. inc.), ♂. Presented by Dr. Marfels. From Burmah. See P. Z. S. 1875, p. 469.  
 1 Rhesus Monkey (*Macacus erythraeus*). Presented by Dr. Marfels. From Burmah. See P. Z. S. 1875, p. 469.  
 1 ditto. Presented by Dr. J. Anderson, F.Z.S. From Burmah.  
 5 Bungoma Tortoises (*Emyda granosa*). Presented by Dr. John Shortt, F.Z.S.  
 1 Three-ridged Terrapin (*Clemmys trijuga*). Presented by Dr. John Shortt, F.Z.S.  
 1 Indian Cobra (*Naja tripudians*). Presented by Dr. John Shortt, F.Z.S.  
 2 Russell's Vipers (*Vipera russelli*). Presented by Dr. John Shortt, F.Z.S.  
 3 Carpet-Vipers (*Echis carinata*). Presented by Dr. John Shortt, F.Z.S.  
 1 Indian Eryx (*Eryx johnii*). Presented by Dr. John Shortt, F.Z.S.  
 1 Indian Python (*Python molurus*). Presented by Dr. John Shortt, F.Z.S.  
 3 Indian Rat-Snakes (*Ptyas mucosa*). Presented by Dr. John Shortt, F.Z.S.  
 5 Long-snouted Snakes (*Passerita mycterizans*). Presented by Dr. John Shortt, F.Z.S.  
 1 Coati (*Nasua nasica*), ♀. Presented by Mrs. Denoon.

- May 20. 1 Molucca Deer (*Cervus moluccensis*), ♂. Born in the Menagerie.  
 2 Darwin's Pucras Pheasants (*Pucrasia darwini*), 2 ♀. Deposited.  
 2 Rendall's Guinea-fowls (*Numida rendalli*), ♂ and ♀. Presented by Mr. J. M. Cornely, C.M.Z.S.  
 2 Common Sheldrakes (*Tudorna vulpanser*), ♂ and ♀. Received in exchange.  
 1 Common Paradoxure (*Paradoxurus typus*), ♂. Presented by Mr. Jones.  
 1 Hoary Snake (*Coronella cana*). Presented by Mr. H. Pybus.  
 21. 2 Smooth-headed Capuchins (*Cebus monachus*), ♂ and ♀. Purchased.  
 6 Common Marmosets (*Hapale jacchus*), 4 ♂ and 2 ♀. Purchased.  
 2 Long-eared Owls (*Otus vulgaris*). Presented by Mr. C. Berguean.  
 1 Grey Francolin (*Francolinus ponticerianus*). Presented by Mr. A. George.  
 2 Rain-Quails (*Coturnix coromandelica*), ♂ and ♀. Presented by Mr. A. George.  
 1 Asiatic Quail (*Perdica asiatica*). Presented by Mr. A. George.  
 1 Australian Monitor (*Monitor gouldi*). Presented by Mr. A. R. Phillips.  
 1 Pike (*Esox lucius*). Presented by Mr. R. Hammond.  
 1 Tench (*Tinca vulgaris*). Presented by Mr. R. Hammond.  
 22. 1 West-Indian Agouti (*Dasyprocta antillensis*). Presented by Mr. C. James.  
 2 King Parrakeets (*Aprosmictus scapulatus*), 2 ♂. Presented by the Countess of Eglinton.  
 23. 1 Red Deer (*Cervus elaphus*), ♀. Presented by Mr. V. H. Vaughan Lee, M.P.  
 24. 1 Bronze-winged Pigeon (*Phaps chalcoptera*). Bred in the Gardens.  
 25. 2 Chestnut-eared Finches (*Amadina castanotis*). Presented by Mrs. G. F. Angas.  
 27. 1 Common Raccoon (*Procyon lotor*), ♂. Presented by Mr. Wesson.  
 1 Rhesus Monkey (*Macacus erythraeus*), ♀. Presented by Mr. David Gooding.  
 1 Reeves's Muntjac (*Cervulus reevesi*), ♀. Born in the Menagerie.  
 1 Grey-cheeked Monkey (*Cercocebus albigena*), ♂. Presented by the late Mr. H. Ansell.  
 1 Marsh-Ichneumon (*Herpestes paludosus*). Presented by the late Mr. H. Ansell.  
 1 Angola Vulture (*Gypohierax angolensis*). Presented by the late Mr. H. Ansell.  
 2 Egyptian Geese (*Chenalopex aegyptiaca*), 2 ♀. From Gaboon, Presented by Mr. R. B. N. Walker, C.M.Z.S.  
 28. 1 Agile Kangaroo (*Macroturus agilis*). Purchased. See P. Z. S. 1875, p. 469.  
 1 Australian Cassowary (*Casuarius australis*). Presented by Mr. E. P. Ramsay, C.M.Z.S. See P. Z. S. 1875, p. 469.  
 1 Black-necked Stork (*Xenorhynchus australis*). From Australia. Presented by Mr. G. C. Moore, C.M.Z.S.

- May 28. 1 Fijian Porphyrio (*Porphyrio vitiensis*). Presented by Mr. G. C. Moore, C.M.Z.S. From New Caledonia.  
 2 Jameson's Gulls (*Larus jamesoni*). Presented by Mr. G. C. Moore, C.M.Z.S. See P. Z. S. 1875, p. 469.
29. 1 Syrian Bear (*Ursus syriacus*), ♀. Presented by Mr. W. Kirby Green.  
 2 Lesser Kestrels (*Falco cenchris*). Purchased.  
 2 Variegated Sheldrakes (*Tadorna variegata*). Bred in the Gardens.
31. 1 Kuhl's Deer (*Cervus kuhlii*). Purchased.  
 2 Victoria Crowned Pigeons (*Goura victoria*). Purchased.  
 2 Bornean Fire-backed Pheasants (*Euplocamus nobilis*), ♂ and ♀. Purchased.  
 2 Great Black Cockatoos (*Microglossa aterrima*). Purchased.  
 1 Green-billed Curassow (*Crax chlororhyncha*). Deposited.  
 1 Grey Ichneumon (*Herpestes griseus*). Presented by Mr. J. E. Thomas.  
 1 Derbian Screamer (*Chauna derbiana*). Purchased.  
 1 Black-faced Spider Monkey (*Ateles ater*), ♂. Presented by Mr. C. F. Filliter.
- June 1. 1 Dusky Parrot (*Pionus violaceus*). Purchased.  
 1 Golden-crowned Conure (*Conurus aureus*). Purchased.  
 1 Rough Terrapin (*Clemmys punctularia*). Purchased.  
 2 Lineated Pheasants (*Euplocamus lineatus*), ♂ and ♀. Presented by the Hon. Ashley Eden.  
 1 Brown Capuchin (*Cebus fatuellus*). Presented by Mr. Chas. Wilson, jun.  
 1 Red-and-blue Macaw (*Ara macao*). Presented by Mr. C. F. Filliter.  
 1 Common Magpie (*Pica caudata*). Deposited.
2. 1 Hybrid Rat Kangaroo (between *Hypsiprymnus ogilbyi* ♀ and *H. gaimardi* ♂). Born in the Menagerie.  
 1 Californian Quail (*Callipepla californica*). Presented by Mr. J. W. Pease, M.P.  
 8 Small Spotted Dogfish (*Seyllium canicula*). Presented by the Brighton Aquarium Company.  
 2 Spotted-billed Ducks (*Anas paccilorhyncha*). Bred in the Gardens. See P. Z. S. 1875, p. 528.  
 3 Chiloe Widgeon (*Mareca chilensis*). Bred in the Gardens.
3. 4 Peacock Pheasants (*Polyplectron chinquis*). Bred in the Gardens.
6. 6 Argus Pheasants (*Argus gigantus*), 2 ♂ and 4 ♀. Deposited.  
 1 Chimpanzee (*Troglodytes niger*), ♀. Deposited.  
 1 Eland (*Oreas canna*), ♀. Born in the Menagerie.  
 1 Virginian Deer (*Cervus virginianus*), ♀. Born in the Menagerie.
7. 1 Vervet Monkey (*Cercopithecus lalandii*), ♀. Deposited.  
 1 Beccari's Cassowary (*Casuarius beccarii*). Presented by Sir James Fergusson, Bart., F.Z.S. From New Guinea. See P. Z. S. 1875, p. 527, pl. lviii.  
 2 Australian Cranes (*Grus australasiana*). Presented by the Acclimatization Society of Wellington, N.Z.  
 1 Owen's Apteryx (*Apteryx oweni*). Presented by Dr. G. Hector, C.M.Z.S.  
 2 Weeka Rails (*Ocydromus australis*). Presented by Dr. G. Hector, C.M.Z.S.  
 1 Black Wood-Hen (*Ocydromus fuscus*). Presented by Dr. G.

- Hector, C.M.Z.S. From Snares Island, south of New Zealand. See P. Z. S. 1875, p. 527.
- June 7. 4 Indigo birds (*Cyanospiza cyana*). Purchased.  
 4 Nonpareil Finches (*Cyanospiza ciris*). Purchased.  
 2 Common Bluebirds (*Sialia wilsonii*). Purchased.  
 2 Lapland Buntings (*Centrophanes lapponica*). Purchased.  
 6 Fire-bellied Toads (*Bombinator igneus*). Presented by Mr. Reginald Hanbury.  
 1 Edible Frog (*Rana esculenta*). Presented by Mr. Reginald Hanbury.
8. 1 Hairy Armadillo (*Dasypus villosus*). Born in the Menagerie.  
 1 Brown Indian Antelope (*Tetraceros subquadricornutus*), ♂. Purchased. See P. Z. S. 1875, p. 527.  
 1 Rattlesnake (*Crotalus durissus*). Purchased.  
 1 Common Cuckoo (*Cuculus canorus*). Presented by Lieut-Col. Crooke.
9. 2 Hybrid Jungle-fowls (bred between *Gallus varius* and *Gallus domesticus*). Presented by Mr. W. T. Fraser, C.M.Z.S.  
 1 Dufresne's Amazon (*Chrysotis dufresniana*). Purchased.
10. 1 Vociferous Sea-Eagle (*Haliaeetus vocifer*). Presented by Mr. H. T. M. Cooper.  
 2 Bengal Foxes (*Canis bengalensis*). Purchased.  
 1 Grant's Gazelle (*Gazella granti*), ♀. Presented by Dr. Kirk, C.M.Z.S. See P. Z. S. 1875, p. 527, pl. lix.  
 4 Vulturine Guinea-fowls (*Numida vulturina*). Deposited.
11. 1 Poe Honey-eater (*Prothemadera novae zealandiae*). Presented by Mrs. Arabin.  
 1 Grey-headed Porphyrio (*Porphyrio poliocephala*). Presented by Mr. Budgett.  
 1 European Pond-Terrapin (*Emys europæa*). Presented by Mr. W. Jesse.
12. 2 Golden Agoutis (*Dasypus aguti*). Born in the Menagerie.  
 1 Black-naped Oriole (*Oriolus chinensis*). Purchased.  
 1 Anaconda (*Eunectes murinus*). Purchased.  
 1 Azara's Opossum (*Didelphys azarae*). Purchased.  
 1 China-chima Milvago (*Milvago china-china*). Purchased.  
 1 White-faced Tree-Duck (*Dendrocygna viduata*). Purchased.  
 1 Brazilian Teal (*Querquedula brasiliensis*), ♂. Purchased.  
 2 Orinoco Geese (*Chenalopea jubata*). Purchased.
14. 7 Spotted-billed Ducks (*Anas pæcilorhyncha*). Bred in the Gardens. See P. Z. S. 1875, p. 528.
15. 2 Dorsal Squirrels (*Sciurus dorsalis*), ♂ and ♀. Presented by John G. Haggard, Esq.  
 1 Dorsal Squirrel (*Sciurus dorsalis*), ♀. Deposited.  
 4 Temminck's Tragopans (*Cerionis temminckii*). Bred in the Gardens.
16. 1 Macaque Monkey (*Macacus cynomolgus*), ♂. Presented by A. Le Miere, Esq.  
 1 Hobby (*Hypotriorchis subbuteo*). Purchased.  
 1 Smooth Snake (*Coronella lævis*). Purchased.  
 10 Summer-Ducks (*Aix sponsa*). Born in the Gardens.
17. 1 Philippine Deer (*Cervus philippinus*), ♂. Purchased.  
 1 Grison (*Galictis vittata*). Purchased.  
 1 Humboldt's Lagothrix (*Lagothrix humboldti*). Purchased.
19. 1 Yellow-shouldered Amazon (*Chrysotis ochroptera*). Presented by Miss A. G. Grady.  
 1 Common Kingfisher (*Alcedo ispida*). Presented by Mr. Swann.

- June 21. 2 Virginian Eagle Owls (*Bubo virginianus*). Deposited.  
 1 Golden Eagle (*Aquila chrysaetos*). Presented by Mrs. L. Home.
22. 1 Black-headed Jackal (*Canis mesomelas*), ♀. Presented by Messrs. Currie & Co.
23. 2 White-winged Choughs (*Corcorax leucopterus*). Purchased.  
 2 Black-headed Buntings (*Emberiza melanocephala*), ♂ and ♀. Purchased.  
 1 Sallé's Amazon (*Chrysotis salléi*). Purchased.  
 1 Martinique Water-Hen (*Porphyrion martinica*). Purchased.  
 2 Chinese Quails (*Coturnix chinensis*), 2 ♂. Presented by Mr. A. Jamrach.  
 2 Hawfinches (*Coccothraustes vulgaris*), 2 ♂. Purchased.  
 1 Small Hill-Mynah (*Gracula religiosa*). Presented by Sir Charles Smith, Bart.  
 1 Indian Coucal (*Centropus rufipennis*). Presented by Mrs. Hunter Blair.
25. 1 Philippine Paradoxure (*Paradoxurus philippinensis*). Presented by Mr. J. Stone, F.L.S.  
 5 Australian Wild Ducks (*Anas superciliosa*). Bred in the Gardens.
28. 1 Douroucoulis (*Nyctipithecus felinus*), ♂. Deposited.  
 1 American Red Fox (*Canis fulvus*). Presented by Mr. Edw. Darke.  
 3 Green Woodpeckers (*Gecinns viridis*). Purchased.  
 6 Trumpeter Swans (*Cygnus buccinator*). Bred in the Gardens.  
 1 Gambian Goshawk (*Astur tibilis*). Purchased.  
 1 Chameleon (*Chameleon vulgaris*). Purchased.
29. 1 Peregrine Falcon (*Falco peregrinus*). Presented by Mr. H. J. Watson.  
 1 Bronze-winged Pigeon (*Phaps chalcoptera*). Bred in the Gardens.  
 1 Hybrid Pigeon (between *Columba gymnopteralma* and *Columba maculosa*). Bred in the Gardens.  
 1 Greek Land-Tortoise (*Testudo graeca*). Presented by Miss Barter.  
 1 Water-Viper (*Cenchris piscivorus*). Presented by Mr. F. Painter.
30. 7 Indian Cobras (*Naia tripudians*). Deposited.
- July 1. 1 Antarctic Skua (*Lestris antarctica*). Presented by Capt. Fairfax.  
 2. 3 Indian Adjutants (*Leptoptilus argala*). Purchased.  
 2 Pondicherry Vultures (*Vultur calvus*), ♂ and ♀. Purchased.  
 3. 1 Common Macaque Monkey (*Macacus cynomolgus*). Presented by Lord Lindsay.  
 1 Sloth Bear (*Melursus labiatus*). Presented by Lieut.-Col. Roberts, R.E.  
 4. 1 Common Fallow Deer (*Dama vulgaris*), ♀. Born in the Menagerie.  
 6. 1 Hog Deer (*Cervus porcinus*), ♂. Born in the Menagerie.  
 2 Giant Tortoises (*Testudo indica*), ♂ and ♀. Purchased. From Aldabra Island. See P. Z. S. 1875, p. 528.  
 7. 1 Maholi Galago (*Galago maholi*). Presented by Mr. C. E. Thomson.  
 7 Garganey Teal (*Querquedula circia*), 5 ♂ and 2 ♀. Deposited.

- July 7. 1 Mandarin Duck (*Aix galericulata*), ♀. Deposited.  
 1 White-eyed Duck (*Myroca leucophthalma*). Deposited.  
 2 Angulated Tortoises (*Chersina angulata*). Presented by Mr. L. A. Knight.  
 4 Green Turtle (*Chelone viridis*, juv.). Presented by Mr. L. A. Knight.  
 8. 1 Malbrouck Monkey (*Cercopithecus cynosurus*). Received in exchange.  
 1 Long-eared Owl (*Otus vulgaris*). Presented by Mr. E. Brown.  
 2 Giant Tortoises (*Testudo indica*), juv. Deposited.  
 2 Radiated Tortoises (*Testudo radiata*). Deposited.  
 2 Blackish Sternotheres (*Sternotherus subniger*). Deposited.  
 10. 5 Chiloe Widgeon (*Marca chiloensis*). Bred in the Gardens.  
 1 Red-and-black Snake (*Erythrolamprus venustissimus*). Purchased.  
 1 Climbing Anabas (*Anabas scandens*). Presented by Mr. F. Buckland.  
 1 Roseate Cockatoo (*Cacatua roseicapilla*). Presented by Mr. A. Thompson.  
 12. 1 Collared Fruit-Bat (*Cynonycteris collaris*). Born in the Gardens.  
 1 Hobby (*Hypotriorchis subbuteo*). Deposited.  
 1 Black-billed Sheathbill (*Chionis minor*). Purchased.  
 13. 1 Chinese Water-Deer (*Hydropotes inermis*). Deposited.  
 2 Suricates (*Suricata zenil*). Presented by Mr. F. Ward.  
 14. 1 Sumatran Rhinoceros (*Rhinoceros sumatrensis*). Deposited. See P. Z. S. 1875, p. 528.  
 2 Golden Eagles (*Aquila chrysaetos*). Presented by Lord Lilford, F.Z.S.  
 15. 6 Green Tree-Frogs (*Hyla arborea*). Presented by the Dowager Lady Jardine.  
 16. 1 Macaque Monkey (*Macacus cynomolgus*). Presented by Mr. G. Vallenien.  
 17. 1 Common Boa (*Boa constrictor*). Purchased.  
 1 Tuberculated Lizard (*Iguana tuberculata*). Purchased.  
 1 West-Indian Rail (*Aramides cayemensis*). Purchased.  
 2 Pileated Jays (*Cyanocorax pileatus*). Purchased.  
 2 Blue-bearded Jays (*Cyanocorax cyanopogon*). Purchased.  
 2 Scarlet Ibises (*Ibis rubra*). Purchased.  
 2 Spotted Tinamous (*Nothura maculosa*). Purchased.  
 2 Californian Quails (*Callipepla californica*). Purchased.  
 2 Guiana Partridges (*Odontophorus guianensis*). Purchased.  
 19. 2 Superb Tanagers (*Calliste fastuosa*). Purchased.  
 1 Festive Tanager (*Calliste festiva*). Purchased. See P. Z. S. 1875, p. 529.  
 1 Brazilian Tanager (*Ramphocelus brasilius*). Purchased.  
 1 Pectoral Tanager (*Euphonia pectoralis*). Purchased. See P. Z. S. 1875, p. 529.  
 3 Violet Tanagers (*Euphonia violacea*). Purchased.  
 3 Blue Sugar-birds (*Dacnis cayana*). Purchased.  
 3 Yellow-winged Blue Creepers (*Certha cyanea*). Purchased.  
 2 Black-throated Siskins (*Chrysomitris barbata*). Purchased.  
 2 Tropical Seed-Finches (*Oryzoborus torridus*). Purchased.  
 1 Pileated Sparrow (*Zonotrichia pileata*). Purchased.  
 1 Yellow Hangnest (*Cassicus persicus*). Purchased.  
 3 De Filippi's Meadow-Starlings (*Sturnella defilippii*). Purchased.  
 2 Silky Cow-birds (*Molothrus bonariensis*). Purchased.



- July 19. 1 Naked-throated Bell-bird (*Chasmorchynchus nudicollis*). Purchased.
- 7 Red-crested Cardinals (*Paroaria cucullata*). Purchased.
- 4 Red-bellied Waxbills (*Estrela rubriventris*). Purchased.
- 1 Chimpanzee (*Troglodytes niger*), ♂. Presented by Capt. Lees, Governor of Lagos. See P. Z. S. 1875, p. 529.
- 1 Coati (*Nasua nasica*). Presented by Mr. J. Scott Tucker.
- 3 Amherst Pheasants (*Thaumalea amherstiae*), 1 ♂ and 2 ♀. Deposited.
- 1 Geoffroy's Blood Pheasant (*Ithaginis geoffroyi*). Deposited.
20. 1 Horned Lizard (*Phrynosoma cornutum*). Presented by Baron G. de Worms, P.Z.S.
- 2 Pike (*Esox lucius*). Presented by Mr. George C. Harvey.
- 1 Many-coloured Parrakeet (*Psephotus multicolor*). Deposited.
21. 1 Rhesus Monkey (*Macacus erythraeus*), ♀. Presented by Mrs. O'Flaherty.
- 1 Elate Hornbill (*Buceros elatus*). Purchased.
- 1 Electric Silurus (*Malapterurus beninensis*). Purchased. See P. Z. S. 1875, p. 529.
- 2 Razor-billed Curassows (*Mitua tuberosa*). Purchased.
- 8 Grey-breasted Parrakeets (*Bolborhynchus monachus*). Purchased.
- 1 Burrowing-Owl (*Pholeopteryx cucularia*). Purchased.
- 1 Red-billed Tree-Duck (*Dendrocygna autumnalis*). Purchased.
22. 1 Tora Antelope (*Alcelaphus tora*), ♀. Purchased. From Upper Nubia. See P. Z. S. 1875, p. 529.
- 2 Red-vented Parrots (*Pionus menstruus*). Purchased.
- 2 Barred-tail Pheasants (*Phasianus reversii*), 2 ♂. Deposited.
- 3 Gold Pheasants (*Thaumalea picta*), 3 ♂. Deposited.
- 2 Common Quails (*Coturnix communis*). Deposited.
23. 2 Brown Indian Antelopes (*Tetracerus subquadrircornutus*). Purchased.
- 1 Sambar Deer (*Cervus aristotelis*). Purchased.
- 1 Black-headed Parrot (*Caiica melanocephala*). Purchased.
- 2 Elegant Parrakeets (*Euphema elegans*). Purchased.
- 1 White-eyebrowed Wood-Swallow (*Artamus superciliosus*). Purchased.
- 2 Chinese Tree-Pies (*Dendrocitta sinensis*). Purchased.
- 1 Midwife Toad (*Alytes obstetricans*). Presented by Mr. F. Buckland, F.Z.S.
- 2 Rufous Tinamous (*Rhynchotus rufescens*). Presented by Mrs. G. Ringrose.
- 1 Vervet Monkey (*Cercopithecus lalandi*). Presented by Mrs. Bond.
- 1 Red-and-yellow Macaw (*Ara chloroptera*). Deposited.
24. 2 Black-faced Spider Monkeys (*Ateles ater*), ♂ and ♀. Purchased. From Cartagena.
- 1 White-fronted Capuchin (*Cebus albifrons*), ♀. Purchased. From Savanilla.
- 2 Central-American Agoutis (*Dasyprocta punctata*). Purchased. From Panama.
- 1 Hawk-billed Turtle (*Chelone imbricata*). Purchased. From Panama.
- 1 Common Hangnest (*Icterus vulgaris*). Purchased. From Rio Hacha.
27. 1 Bronze-winged Pigeon (*Phaps chalcoptera*). Bred in the Gardens.

- July 27. 1 Crested Pigeon (*Ocyphaps lophotes*). Bred in the Gardens.  
 6 Hybrid Japanese Pheasants (between *Phasianus versicolor* and *P. torquata*). Bred in the Gardens.  
 5 Amherst Pheasants (*Thaumalea amherstiae*). Bred in the Gardens.  
 2  $\frac{3}{4}$ -breed Amherst Pheasants (between *T. amherstiae* and hybrid *T. picta*). Bred in the Gardens.  
 2 Diuca Finches (*Diuca grisea*). Purchased.  
 28. 1 Punjab Wild Sheep (*Ovis cycloceros*), ♂. Presented by Commander Garforth. From Muscat, Gulf of Oman. See P. Z. S. 1875, p. 529.  
 30. 1 Short-tailed Muntjac (*Cervulus mircurus*), ♀. Born in the Gardens.  
 6 Australian Wild Ducks (*Anas superciliosa*). Bred in the Gardens.  
 31. 1 Golden-naped Amazon (*Chrysotis auripalliat*). Deposited.  
 1 Grey Ichneumon (*Herpestes griseus*). Presented by Mr. J. F. Wisden.  
 5 Chinchillas (*Chinchilla lanigera*). Purchased.  
 2 Rheas (*Rhea americana*). Purchased.  
 2 Yarrell's Curassows (*Crax carunculata*). Purchased. From S. Brazil.  
 1 Razor-billed Curassow (*Mitua tuberosa*). Purchased. From S. Brazil.  
 1 White-bellied Guan (*Ortalida albiventris*). Purchased. From Cape Frio.  
 2 Burrowing Owls (*Pholeopteryx cucularia*). Purchased.  
 1 West-Indian Rail (*Aramides cayennensis*). Purchased. From Pará.
- Aug. 3. 1 Squirrel Monkey (*Saimaris sciurea*), ♂. Purchased.  
 1 Common Kestrel (*Tinnunculus alaudarius*). Presented by Mr. E. M. Burton.  
 4 Amherst Pheasants (*Thaumalea amherstiae*). Bred in the Gardens.  
 1 Siamese Pheasant (*Emplocamus praelatus*). Bred in the Gardens.  
 4. 1 Rose-crested Cockatoo (*Cacatua moluccensis*). Deposited.  
 1 Common Hangnest (*Icterus vulgaris*). Deposited.  
 1 Herring-Gull (*Larus argentatus*). Presented by Dr. C. R. Bree, F.Z.S.  
 1 Hybrid Dove (between *Columba maculosa* and *C. gymnophthalma*). Bred in the Gardens.  
 2 Vinaceous Doves (*Turtur vinaceus*). Bred in the Gardens.  
 5. 2 Jaguars (*Felis onca*). Purchased.  
 1 Ground-Hornbill (*Buceros abyssinicus*). Deposited.  
 6. 1 Manatee (*Manatus americanus*), ♀. Purchased. See P. Z. S. 1875, p. 529.  
 8. 1 White-thighed Colobus (*Colobus bicolor*), ♀. Deposited.  
 9. 1 Argus Pheasant (*Argus giganteus*), ♂. Received in exchange.  
 2 Purple Cow-birds (*Molothrus purpureus*), ♂ and ♀. Presented by Prof. W. Nation, C.M.Z.S.  
 10. 1 Malabar Squirrel (*Sciurus maximus*), ♀. Presented by Chevalier Blondin.  
 1 Yellow-fronted Amazon (*Chrysotis ochrocephala*). Presented by Mrs. Bolton.

- Aug. 10. 1 Crested Peacock Pheasant (*Polyplectron chinquis*), ♂. Purchased.
11. 2 American Crows (*Corvus americanus*). Presented by Mr. Savile G. Reid.
13. 1 Coypu (*Myopotamus coypus*), ♂. Purchased.
14. 3 Spotted Cavies (*Calogenys paca*). Purchased.  
3 Hoffman's Sloths (*Choloepus hoffmanni*). Purchased.  
1 Red Deer (*Cervus elaphus*), ♀. Presented by Mr. S. Carter.  
1 Edible Frog (*Rana esculenta*). Presented by Miss M. Garrard.
15. 1 Common Adder (*Vipera berus*). Presented by Mr. H. J. Johnson.
16. 2 Kinkajous (*Cercoleptes caudivolvulus*), 2 ♀. Presented by Mr. James Wickin.  
1 Central-American Agouti (*Dasyprocta punctata*). Presented by Mr. J. C. Hussey.  
2 Brown Gannets (*Sula fusca*). Presented by Mr. J. C. Hussey. From Port Lemon, Costa Rica. See P. Z. S. 1875, p. 529.  
1 Woodford's Owl (*Syrnium woodfordi*). Presented by Mr. W. E. Oates. See P. Z. S. 1875, p. 529.
17. 2 Crested Pigeons (*Ocyphaps lophotes*). Bred in the Gardens.  
2 Scorpion Mud-Terrapins (*Cinosternon scorpioides*). Presented by Mr. Devonish.
18. 1 West-Indian Agouti (*Dasyprocta antillensis*). Presented by Mr. G. H. Hawtayne.
19. 1 Blotched Genet (*Genetta tigrina*). Bred in the Gardens.  
1 Purple-capped Lory (*Lorius domicella*). Presented by Mr. T. P. Medley.  
2 Green Toads (*Bufo viridis*). Presented by Mr. F. Coleman.  
2 Fire-bellied Toads (*Bombinator igneus*). Presented by Mr. F. Coleman.  
5 Green Tree-Frogs (*Hyla arborea*). Presented by Mr. F. Coleman.  
1 Spotted Salamander (*Salamandra maculosa*). Presented by Mr. F. Coleman.  
4 Alpine Newts (*Triton alpestris*). Presented by Mr. F. Coleman.
20. 1 Tiger (*Felis tigris*). Deposited.  
5 Starred Tortoises (*Testudo stellata*). Deposited.  
1 Crested Guan (*Penelope cristata*). Presented by Mr. A. War-  
mington. From Venezuela.  
1 White-thighed Colobus (*Colobus bicolor*). Deposited.  
1 Wryneck (*Yunx torquilla*). Presented by Mr. G. H. Brooks.
23. 5 Bonnet-Monkeys (*Macacus radiatus*). Presented by Mr. J. B. Tunnard.  
1 Yellow Baboon (*Cynocephalus babouin*), ♀. Presented by Mr. J. B. Tunnard.  
1 Sykes's Monkey (*Cercopithecus albicularis*). Presented by Mr. J. B. Tunnard.
24. 1 Herring-Gull (*Larus argentatus*). Presented by Mr. H. P. Hughes, Jun.
25. 1 Hybrid Pigeon (between *Columba maculosa* and *C. gymnoph-  
thalma*). Bred in the Gardens.
26. 1 Common Marmoset (*Hapule jacchus*). Presented by Mrs. Puente.  
1 Axis Deer (*Cervus axis*). Bred in the Gardens.
28. 1 Darwin's Pucras (*Pucrasia darwini*). Deposited.

- Aug. 29. 1 Indian Cobra (*Naja tripudians*). Deposited.
30. 5 American Box-Tortoises (*Terrapene carinata*). Presented by Mr. Edmond Isaacson. From Nicaragua.
- 1 Wrinkled Terrapin (*Clemmys rugosa*). Presented by Mr. Edmond Isaacson. From Nicaragua.
- Sept. 1. 1 Indian Fruit-Bat (*Pteropus medius*). Purchased.
2. 1 Wapiti Deer (*Cervus canadensis*). Born in the Gardens.
- 1 Arctic Fox (*Canis lagopus*). Presented by Mr. C. R. Wood, R.N.
3. 1 Montagu's Harrier (*Circus cineraceus*). Captured in the Isle of Wight. Presented by Capt. Hadfield.
- 1 West-African Tantalus (*Tantalus ibis*). Received in exchange.
- 2 Brazilian Tortoises (*Testudo tabulata*). Received in exchange.
- 1 Abyssinian Pentonyx (*Pelomedusa gehafi*). Received in exchange.
- 1 Indian Leopard (*Felis pardus*). Presented by Mr. J. Nicholls.
- 1 Lesser Sulphur-crested Cockatoo (*Cacatua sulphurea*). Presented by Mrs. Smith.
- 3 Picazuro Pigeons (*Columba picazuro*). Presented by Mr. F. C. Webb. From Rio Grande do Sul.
- 1 White-faced Owl (*Sceloglaux albifacies*). Purchased. See P. Z. S. 1875, p. 530.
6. 1 Malabar Parrakeet (*Palaeornis columboides*). Purchased.
- 1 Blue-crowned Conure (*Conurus hemorrhous*). Purchased.
- 2 Burrowing Owls (*Pholeopteryx cucularia*). Purchased.
- 2 Fork-tailed Jungle-fowls (*Gallus varius*). From Java. Presented by Mr. W. T. Fraser, C.M.Z.S.
- 2 Hybrid Jungle-fowls (between *G. varius* and *G. domesticus*). Presented by Mr. W. T. Fraser, C.M.Z.S.
7. 1 Dotterel (*Charadrius morinellus*). Captured near Colchester. Presented by Dr. C. R. Bree, F.Z.S.
- 1 Spotted Salamander (*Salamandra maculosa*). Presented by Mr. A. H. Smith, F.Z.S.
- 1 Sumatran Wild Dog (*Canis rutilans*). Presented by Mr. Mumford. See P. Z. S. 1875, p. 530.
- 2 Rosy-billed Ducks (*Metopiana peposaca*). Bred in the Gardens.
- 11 Blackish Sternotheres (*Stenotharus subniger*). Deposited.
9. 1 Royal Python (*Python regius*). Presented by Capt. Cooper.
10. 2 Glaucous Gulls (*Larus glaucus*). Presented by Capt. Loftus F. Jones, R.N. From Greenland.
- 1 Weeper Capuchin (*Cebus capucinus*). Deposited.
- 1 Golden-crowned Conure (*Conurus aureus*). Deposited.
11. 1 Syrian Fennec Fox (*Canis famelicus*). From Bushire, Persian Gulf. Cf. P. Z. S. 1875, p. 420. Presented by Mr. E. Sandys Dawes.
13. 1 Reeves's Muntjac (*Cervulus reevesi*), ♂. Born in the Gardens.
- 1 Vinaceous Turtledove (*Turtur vinaceus*). Bred in the Gardens.
- 1 Bronze-winged Pigeon (*Phaps chalcoptera*). Bred in the Gardens.
- 1 Getulian Ground-Dove (*Xerus getulus*). Purchased.
- 1 Wood-Pigeon (*Columba palumbus*). Presented by Mr. Cheesman.
14. 1 Common Raccoon (*Procyon lotor*). Presented by Mr. W. Binder.

- Sept. 14. 2 Domestic Sheep (*Ovis aries*), ♂ and ♀. Presented by Mr. T. Gray. From Aden.
- 1 Egyptian Gazelle (*Gazella dorcas*), ♀. Deposited.
  - 1 Green Monkey (*Cercopithecus callitrichus*), ♂. Deposited.
  - 2 Yellow Wagtails (*Motacilla flava*). Presented by Messrs. Swaysland and Son.
  - 1 Tree-Pipit (*Anthus arboreus*). Presented by Messrs. Swaysland and Son.
  - 1 Meadow-Pipit (*Anthus pratensis*). Presented by Messrs. Swaysland and Son.
15. 1 Common Sheldrake (*Tadorna vulpanser*), ♀. Presented by Miss Maud Howard.
- 1 Natterjack Toad (*Bufo calamita*). Presented by Mr. F. Buckland, F.Z.S.
16. 1 Goffin's Cockatoo (*Cacatua goffini*). Presented by Mrs. Barton.
- 6 Houbara Bustards (*Houbara undulata*). Purchased.
  - 1 Many-coloured Parrakeet (*Psephotus multicolor*). Received in exchange.
17. 1 Sulphury Tyrant (*Pitangus sulphuratus*). Purchased.
- 1 Brazilian Hangnest (*Icterus jamaici*). Purchased.
  - 2 Red-rumped Hangnests (*Cassicus haemorrhous*). Purchased.
  - 3 Blue-bearded Jays (*Cyanocorax cyanopogon*). Purchased.
18. 1 Wapiti Deer (*Cervus canadensis*), ♀. Born in the Gardens.
- 1 Macaque Monkey (*Macacus cynomolgus*), ♀. Presented by Mrs. Kent.
  - 1 Rose-crested Cockatoo (*Cacatua moluccensis*). Presented by Mrs. Sydenham.
21. 5 Russell's Vipers (*Vipera russelli*). Born in the Gardens.
22. 2 Rattle-Snakes (*Crotalus durissus*). Received in exchange.
- 1 Long-nosed Crocodile (*Crocodilus cataphractus*). Received in exchange.
23. 2 Bonnet-Monkeys (*Macacus radiatus*), ♂ and ♀. Presented by Mr. Turnbull.
- 1 Macaque Monkey (*Macacus cynomolgus*), ♂. Presented by Mr. Knight.
24. 2 Common Wolves (*Canis lupus*). Presented by Mr. C. Bell.
- 1 Chinese Mynah (*Acridotheres cristatellus*). Presented by Mr. J. R. France.
27. 1 Ocelot (*Felis pardalis*), ♀. Presented by Mr. H. Kirtley.
- 1 Common Crowned Pigeon (*Goura coronata*). Bred in the Gardens.
  - 2 Crested Pigeons (*Ocyphaps lophotes*). Bred in the Gardens.
  - 1 Hybrid Pigeon (between *Columba maculosa* and *C. gymnophthalma*). Bred in the Gardens.
28. 2 Bronze-spotted Doves (*Chalcopelia chalcospilos*). Presented Capt. Arbuckle, R.M.L.I.
29. 1 Crab-eating Opossum (*Didelphys canerivora*). Purchased.
- 1 Raven (*Corvus corax*). Presented by Mr. H. A. Hancock.
30. 2 Red-and-yellow Macaws (*Ara chloroptera*). Presented by the Misses Rix.
- 1 American Darter (*Plotus anhinga*). Purchased. See P. Z. S. 1875, p. 530.
- Oct. 1. 4 Tigers (*Felis tigris*). Presented by H.E. the Governor-General of India.
- 2 Musanga Paradoxures (*Paradoxurus musanga*). Deposited.
  - 1 Chilean Sea-Eagle (*Geranoaëtus aquia*). Presented by Mr. E. Nelson.

- Oct. 1. 1 Cuvier's Toucan (*Ramphastos cuvieri*). Presented by Mr. A. Blumenthal.  
 1 Black Lemur (*Lemur macaco*), ♀. Presented by F. Babington Peile, Esq.  
 1 Common Nightjar (*Caprimulgus europæus*). Presented by Col. Leas.  
 1 Great-billed Parrakeet (*Tanygnathus megalorhynchus*). Purchased.  
 2. 1 Golden Agouti (*Dasyprocta aguti*). Presented by Mr. H. T. Balfour.  
 2 Mexican Deer (*Cervus mexicanus*), ♂ and ♀. Purchased.  
 1 Common Heron (*Ardea cinerea*). Presented by Mr. L. Smythe.  
 1 Herring-Gull (*Larus argentatus*). Presented by Mr. L. Smythe.  
 4. 2 Argus Pheasants (*Argus giganteus*); 2 ♀. Deposited.  
 5. 1 Brown Bear (*Ursus arctos*), ♂. Presented by Mr. A. Vale.  
 1 Brown Bear (*Ursus arctos*), ♀. Presented by W. H. Beaton, Esq.  
 1 Peewit (*Panellus cristatus*). Presented by Dr. W. Brewer.  
 6. 1 Scolopaceous Courlan (*Aramus scolopaceus*). Purchased. See P. Z. S. 1875, p. 567.  
 7. 2 Graceful Ground-Doves (*Geopelia cuneata*). Received in exchange.  
 1 Alligator (*Alligator mississippiensis*). Deposited.  
 1 Common Snake (*Tropidonotus natrix*). Deposited.  
 8. 2 Vervet Monkeys (*Cercopithecus lalandi*). Presented by Mrs. Abbett.  
 2 Grey-breasted Parrakeets (*Bolborhynchus monachus*). Presented by Miss Maiden.  
 9. 1 Campbell's Monkey (*Cercopithecus campbelli*), ♂. Presented by Miss A. J. Brown.  
 1 Common Hare (*Lepus timidus*). Presented by Mr. M. A. Carr.  
 11. 1 Kestrel (*Tinnunculus alaudarius*). Presented by Mr. J. H. Willmore.  
 12. 2 Persian Gazelles (*Gazella subgutturosa*), ♂ and ♀. Presented by Mr. Archibald Gray.  
 1 Golden-crowned Conure (*Conurus aureus*). Presented by Col. M'Arthur.  
 1 Common Chameleon (*Chamaleon vulgaris*). Presented by Mr. F. Coleman.  
 13. 2 Crested Porcupines (*Hystrix cristata*). Deposited.  
 2 Servals (*Felis serral*). Deposited.  
 1 Levaillant's Cynictis (*Cynictis penicillata*). Deposited.  
 1 Derbian Wallaby (*Halmaturus derbianus*), ♀. Born in the Menagerie.  
 14. 1 Ruddy Ichneumon (*Herpestes smithi*), ♂. Presented by Mr. W. R. Best.  
 15. 1 Scarlet Ibis (*Ibis rubra*). Deposited.  
 16. 1 Common Boa (*Boa constrictor*). Presented by Dr. H. Wood.  
 17. 1 Hybrid Rat Kangaroo (between *Hypsiprymnus gaimardi* ♂ and *H. ogilbyi* ♀), ♀. Born in the Gardens.  
 18. 1 Missel-Thrush (*Turdus viscivorus*). Presented by Mrs. Watson.  
 1 Binturong (*Arctictis binturong*). Presented by Capt. A. R. Ord. See P. Z. S. 1875, p. 567.  
 19. 1 Grey Wagtail (*Motacilla boarula*). Purchased.  
 21. 1 Cape-Buffalo (*Bubalus caffer*), ♀. Born in the Gardens.  
 7 Picked Dogfish (*Acanthius vulgaris*). Purchased.  
 23. 1 Wood-Owl (*Syrnium aluco*). Presented by Mr. F. Braund.

- Oct. 26. 1 Polar Bear (*Ursus maritimus*), ♂. Deposited.  
 1 Smooth-headed Capuchin (*Cebus monachus*). Deposited.  
 2 Lesser Whitethroats (*Sylvia curruca*). Presented by Mr. A. E. Field.  
 2 Yellow Wagtails (*Motacilla flava*). Presented by Mr. A. E. Field.
27. 1 Rhesus Monkey (*Macacus erythraeus*), ♂. Presented by Mr. R. Roberts.  
 1 Golden Eagle (*Aquila chrysaetos*). Deposited.
28. 1 Macaque Monkey (*Macacus cynomolgus*), ♂. Presented by Mrs. Gibbs.  
 1 Caspian Ouaran (*Psammosaurus caspicus*). Presented by Capt. Phillips. From Busreh, Persian Gulf.
30. 2 Golden Agoutis (*Dasyprocta aguti*). Born in the Gardens.  
 2 Central-American Agoutis (*Dasyprocta punctata*). Presented by Mr. W. G. Davis.  
 1 Crocodile (*Crocodilus*, sp. inc.). Purchased.  
 2 Maximilian's Aracaras (*Pteroglossus wiedi*). Purchased.  
 1 White-throated Capuchin (*Cebus hypoleucus*). Purchased.
- Nov. 2. 1 Egyptian Goose (*Chenalopex aegyptiaca*), ♂. Presented by Dr. E. Swain.
4. 2 Macaque Monkeys (*Macacus cynomolgus*), ♂ and ♀. Presented by Mrs. Tipping.  
 1 White-faced Guan (*Penelope jacucaca*). Deposited.  
 1 White-eyebrowed Guan (*Penelope superciliaris*). Deposited.  
 1 Vulpine Phalanger (*Phalangista vulpina*), white var. Purchased.
5. 1 Blue-and-yellow Macaw (*Ara ararauna*). Purchased.  
 1 Ring-necked Parakeet (*Palcornis torquata*). Presented by Miss Thirlwall.
6. 2 Jambu Fruit-Pigeons (*Ptilonopus jambu*). Deposited.
6. 2 Upland Geese (*Chloephaga magellanica*), ♂ and ♀. Received in exchange.
8. 1 Beisa Antelope (*Oryx beisa*), ♀. Presented by H.H. the Sultan of Zanzibar. See P. Z. S. 1875, p. 633.  
 1 Horned Lizard (*Phrynosoma cornutum*). Presented by Mr. W. Dawson.
9. 1 Bonnet-Bonkey (*Macacus radiatus*), ♂. Presented by Mr. Aspinall.  
 1 Grey Ichneumon (*Herpestes griseus*), ♀. Presented by Mr. J. Jennings.  
 1 Central-American Agouti (*Dasyprocta punctata*). Presented by Mr. W. J. Henderson.
10. 1 Plantain-Squirrel (*Sciurus plantani*). Presented by Master E. H. Cole.
11. 1 Malbrouck Monkey (*Cercopithecus cynosurus*), ♀. Presented by Mr. C. L. N. Newman.  
 2 Cuming's Octodons (*Octodon cumingi*). Born in the Gardens.
12. 1 Mona Monkey (*Cercopithecus mona*), ♀. Deposited.  
 1 Campbell's Monkey (*Cercopithecus campbelli*). Deposited.  
 1 Spotted Ichneumon (*Herpestes auropunctatus*). Presented by Mr. L. B. Lewis.  
 1 Central-American Agouti (*Dasyprocta punctata*). Presented by Capt. E. Hairby.
13. 1 Dufresne's Amazon (*Chrysotis dufresniana*). Presented by the Rev. A. Hibbit.

- Nov. 15. 1 Arabian Baboon (*Cynocephalus hamadryas*). Presented by Mrs. M. A. Moore.
- 1 Golden Tench (*Tinea vulgaris*). Presented by Mr. S. C. Hincks.
16. 1 Macaque Monkey (*Macacus cynomolgus*), ♀. Presented by Mrs. Marsh Nelson.
- 1 Green Monkey (*Cercopithecus callitrichus*). Presented by Mr. W. Winter.
- 1 Pampas Deer (*Cercus campestris*), ♂. Presented by Capt. E. Hairby. From Uruguay.
- 1 Capybara (*Hydrocharrus capybara*). Purchased.
- 2 Central-American Agoutis (*Dasyprocta punctata*). Purchased.
- 2 Yellow-winged Blue Greepers (*Careba cyanea*). Purchased.
- 2 All-green Tanagers (*Chlorophonia viridis*). Purchased. See P. Z. S. 1875, p. 633.
17. 2 West-Indian Rails (*Aramides cayennensis*). Purchased.
- 2 Naked-throated Bell-birds (*Chasmorhynchus nudicollis*). Purchased.
- 2 Yellow Hangnests (*Cassicus persicus*). Purchased.
- 1 Sulphury Tyrant (*Pitangus sulphuratus*). Purchased.
- 2 Palm-Tanagers (*Tanagra palmarum*). Purchased.
- 1 Silver-blue Tanager (*Tanagra cana*). Purchased.
- 4 Blue-bearded Jays (*Cyanocorax cyanopogon*). Purchased.
- 1 Saffron Finch (*Sycalis flaveola*), ♀. Purchased.
- 3 Bluish Finches (*Spermophila caerulescens*), 2 ♂ and 1 ♀. Purchased.
- 1 Blue Grosbeak (*Guiraca cyanea*), ♀. Purchased.
- 5 Pileated Finches (*Coryphospingus pileatus*), 4 ♂ and 1 ♀. Purchased.
- 1 Half-white Finch (*Spermophila hypoleuca*), ♀. Purchased.
- 1 Black-humped Spider-Monkey (*Ateles melanochir*). Presented by Mr. H. W. Oakes.
18. 1 Herring-Gull (*Larus argentatus*). Presented by Mr. P. Gippis.
19. 1 Green Monkey (*Cercopithecus callitrichus*), ♀. Deposited.
- 1 Rose-crested Cockatoo (*Cacatua moluccensis*). Deposited.
- 1 Western Slender-billed Cockatoo (*Licmetis pastinator*). Presented by Mr. W. J. Irving.
20. 5 Darwin's Pueras Pheasants (*Puerasia darwini*), 3 ♂ and 2 ♀. Deposited.
22. 1 Bonnet-Monkey (*Macacus radiatus*), ♀. Presented by Mr. Gordon Adam.
- 1 Ring-necked Parrakeet (*Palaeornis torquata*). Presented by Capt. Ouchterlony.
24. 1 Kinkajou (*Cerculeptes caudivolutus*). Deposited.
25. 2 Palm-Squirrels (*Sciurus palmarum*). Presented by Mr. C. Temple (93rd Highlanders).
26. 6 Beavers (*Castor canadensis*). Deposited.
- 2 Ground-Rats (*Aulacodus swindermanus*). Received in exchange.
- 1 Arctic Fox (*Canis lagopus*). Presented by Mr. H. H. Gibbs, F.Z.S.
- 4 Dunlins (*Tringa cinclus*). Presented by Mr. F. Cresswell.
- 4 Knots (*Tringa canutus*). Presented by Mr. F. Cresswell.
27. 4 Common Siskins (*Chrysomitris spinus*), 2 ♂ and 2 ♀. Purchased.
30. 1 Green Monkey (*Cercopithecus callitrichus*), ♀. Presented by Mr. C. F. Wood.
- Dec. 1. 1 Prince Alfred's Deer (*Cervus alfredi*), ♂. Born in the Gardens.



- Dec. 2. 2 Alligators (*Alligator mississippiensis*), juv. Deposited.  
 29 Basse (*Labrax lupus*). Purchased.  
 1 Grey Mullet (*Mugil capito*). Purchased.  
 6 Cotti (*Cottus bubalis*). Purchased.
3. 1 Macaque Monkey (*Macacus cynomolgus*), ♂. Presented by Miss Kate Symonds.
6. 1 Tree-Sparrow (*Passer montanus*). Purchased.  
 2 Mountain-Linnets (*Linaria flavirostris*). Purchased.
8. 1 West-African Python (*Python sebae*). Presented by Mr. W. H. Berkeley.
10. 1 Yellow-faced Amazon (*Chrysotis ochrocephala*, var.). Presented by Mrs. Sproston.
14. 1 Blue-crowned Parrakeet (*Tanygnathus lucionensis*). Presented by Master Hugh Sutton.
15. 2 Bengal Leopard Cats (*Felis bengalensis*), ♂ and ♀. Presented by Mr. W. A. Cuthell. From Cashmere.  
 2 Love-bird Parrakeets (*Agapornis pullaria*), ♂ and ♀. Purchased.
16. 1 Hoffmann's Sloth (*Cholopus hoffmanni*). Purchased. From Panama.  
 2 Wrinkled Terrapins (*Clemmys rugosa*).  
 1 White-mouthed Terrapin (*Cinosternon leucostomum*).  
 1 Duck-Falcon (*Falco anatum*). Purchased. Captured at sea off San Domingo.  
 1 Ocelot (*Felis pardalis*). Purchased.  
 5 Guiana Partridges (*Odontophorus guianensis*). Purchased.  
 1 West-Indian Rails (*Aramides cayennensis*). Purchased.
17. 2 Peacock Pheasants (*Polyplectron chinquis*), ♂ and ♀. Deposited.  
 1 Bay Antelope (*Cephalophus dorsalis*), ♀. Received in exchange.
18. 1 Hairy Armadillo (*Dasypus villosus*), ♀. Purchased.  
 1 Black-headed Conure (*Conurus nanday*). Purchased.  
 1 Haast's Antelope (*Apteryx haasti*). Presented by Baron F. von Mueller, C.M.Z.S. See P. Z. S. 1876, p. 1.
20. 1 Macaque Monkey (*Macacus cynomolgus*). Presented by Mr. J. A. Ferris.
21. 1 White-fronted Lemur (*Lemur albifrons*), ♀. Deposited.  
 1 Gavia (*Gavia gangeticus*). Presented by Capt. Barnet.  
 1 Ichneumon (*Herpestes griseus*). Deposited.  
 1 Macaque Monkey (*Macacus cynomolgus*). Deposited.
22. 1 Black Lemur (*Lemur macaco*), ♀. Presented by Capt. Burke.  
 1 Common Fox (*Canis vulpes*). Presented by Mr. W. Saville.  
 1 Yellow Baboon (*Cynocephalus babouin*), ♂. Purchased.
23. 1 Night-Parrot (*Stringops habroptilus*). Presented by Mr. I. E. Featherston. See P. Z. S. 1876, p. 1.
- 1 Vervet Monkey (*Cercopithecus lalandii*). Deposited.
27. 1 Earl's Weka Rail (*Ocydromus earli*). Presented by Capt. H. Braddick.
28. 3 Moose (*Alces machlis*), 3 ♂. Deposited. See P. Z. S. 1876, p. 1.
31. 1 Green Monkey (*Cercopithecus callitrichus*). Presented by the Rev. F. W. Ayre.  
 2 Arabian Gazelles (*Gazella arabica*). Deposited.

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